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Issue 9 – March 2004

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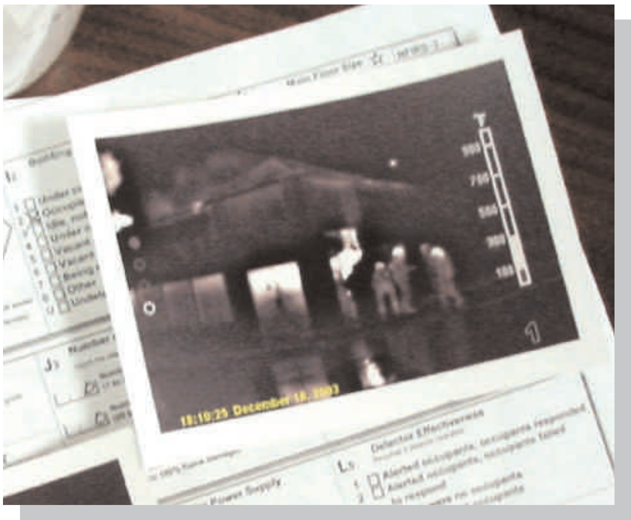

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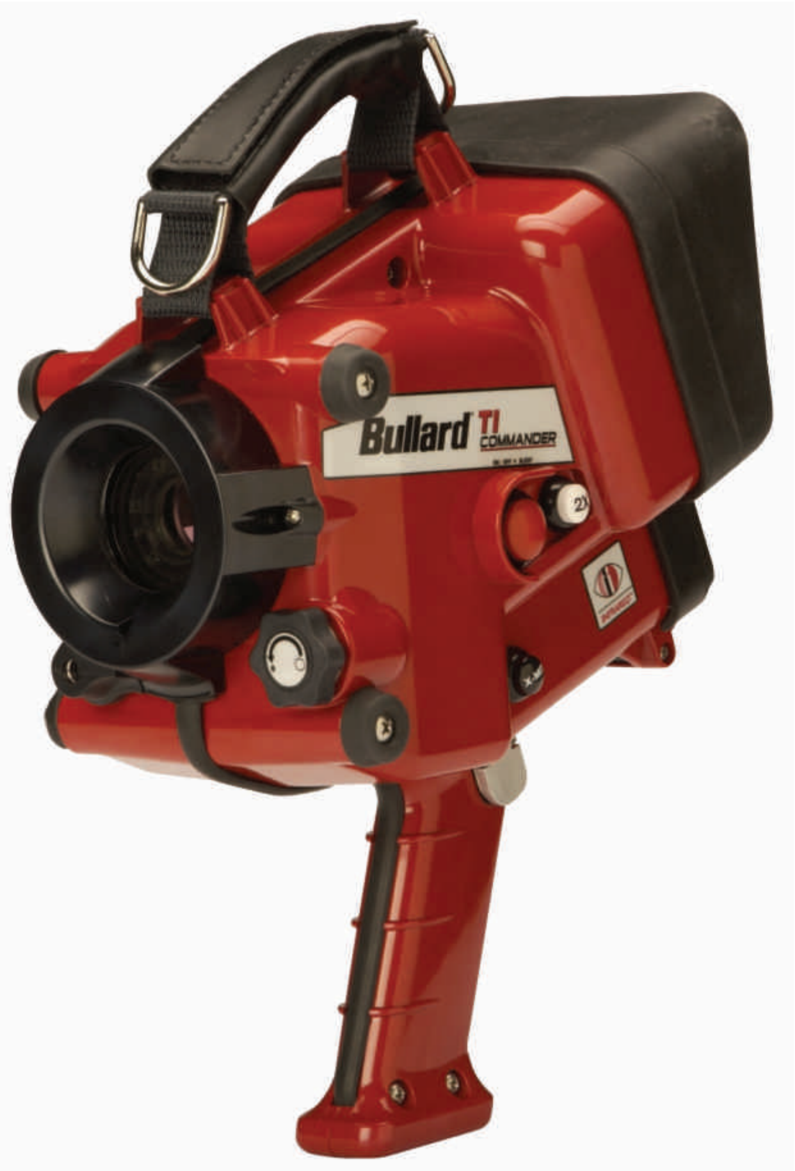

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NEW SOUTH WALES
FIRE
RESCUE HAZMAT
REPORTING TO THE ASIA PACIFIC FIRE PROTECTION AND FIRE SERVICE INDUSTRY

Front cover picture: A firefighter removes his helmet as he faces fires on the outskirts of northern Sydney.
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FOREWORD

by Jeff Godfredson

NFPA's Asia-Pacific Operations Director

Compliance with Codes

Some recent events have focused my mind on the issue of Code compliance. Unfortunately there have been two recent events which involved the deaths of Firefighters and others which have implications regarding Code compliance. The events were the sudden structural collapse of buildings involved in fire. One occurred in China and killed twenty Firefighters and the other was in Egypt and killed at least twelve Firefighters and Police. Whilst I am not in a position to make any comment on the specific events, as I am not privy to the circumstances: it does raise the issue of Code compliance.

For those not directly involved in the creation and use of Codes and Standards it may seem an uninteresting and complex issue but for developing countries it is a crucial issue as infrastructure and new construction increases dramatically. The legacy that will be left for future generations to deal with in emergencies will depend on the Codes chosen and whether there are assurances regarding compliance and maintenance.

The first issue is which Codes to use. The Codes chosen must be current, allow use of new technology and be updated on a regular basis. They should also be created in an environment which does not allow dominance by any special interest group. Not surprisingly I would recommend NFPA Codes for this purpose.

The next issue is for those providing approvals to understand the Codes fully.

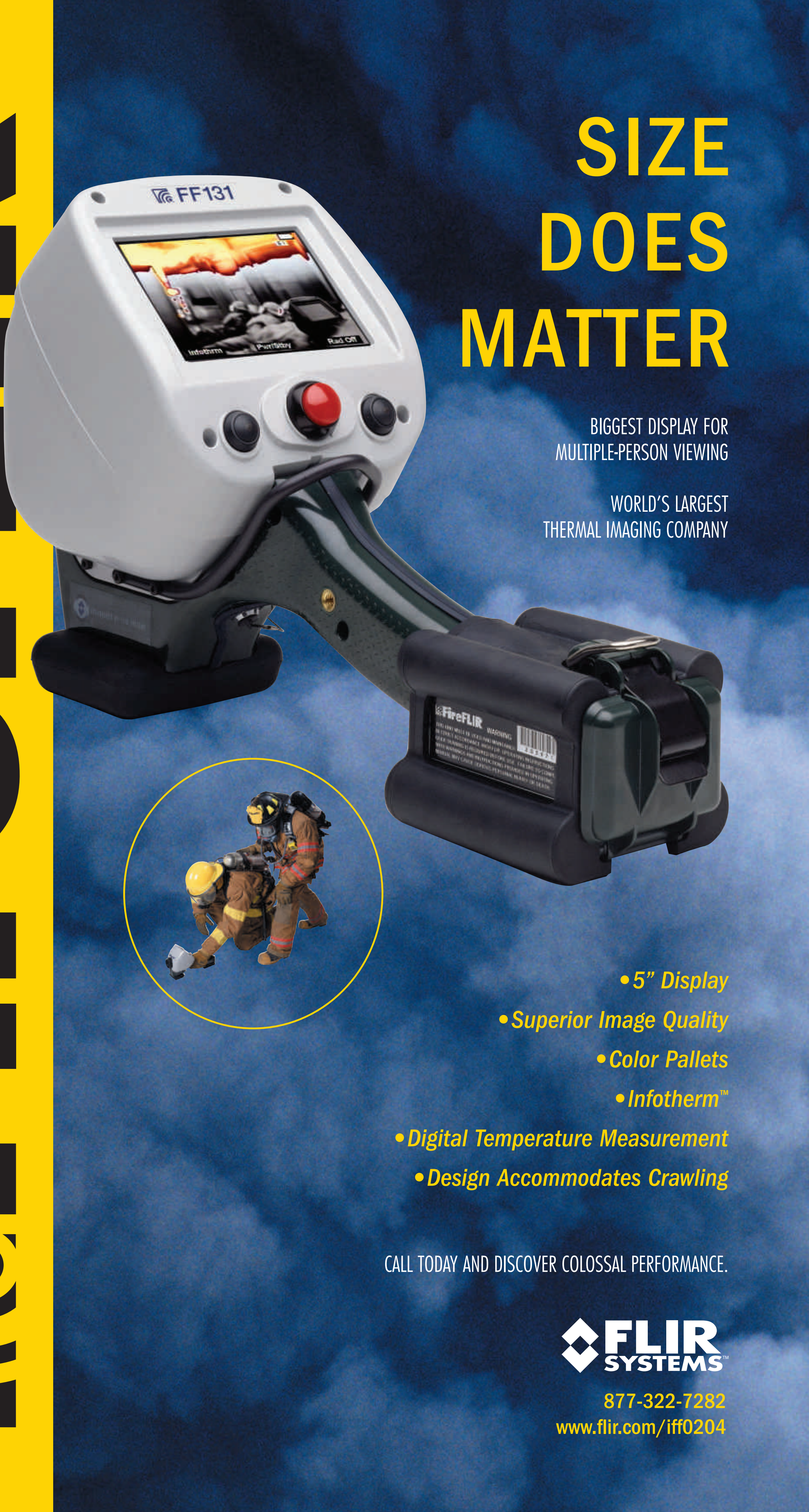
There is a need to ensure compliance at time of construction. Compliance cannot be achieved on the basis of total trust of the builder but should include inspections at least on a random basis.

Finally there is the need for Inspection and Maintenance on the intervals called for in Codes.

Without Code compliance we will see the number of tragedies involving loss of life of the public and Emergency Services increase dramatically.

I wish I was wrong, but I know I am not.

Jeff Godfredson
NFPA's Asia-Pacific Operations Director



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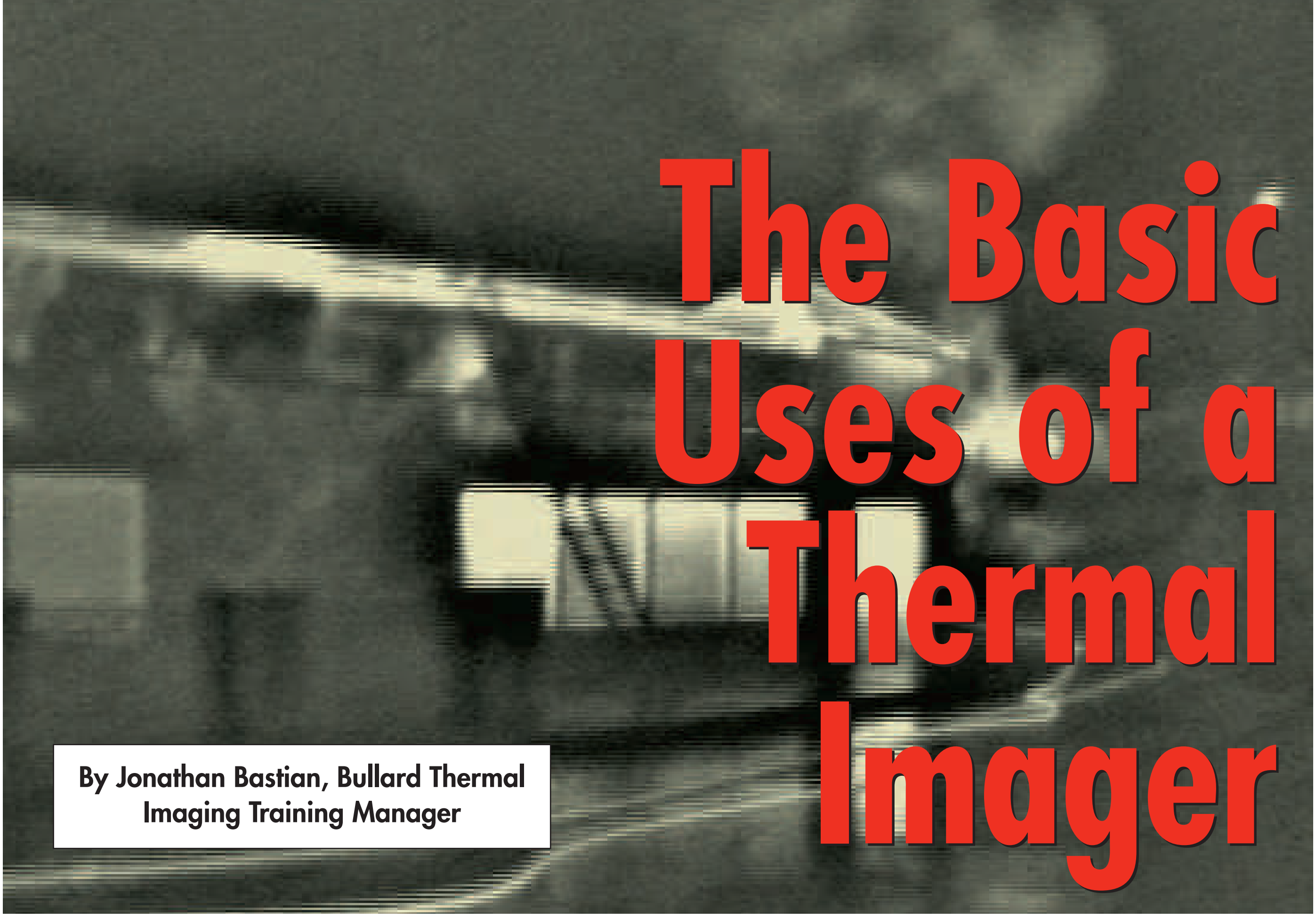
The Basic Uses of a Thermal Imager

By Jonathan Bastian, Bullard Thermal Imaging Training Manager



TI Comm type 3 fire

THERMAL IMAGING is one of the newest technologies to enter the fire service. The rapid acceptance of thermal imagers by the fire service alludes to the importance of these new tools. The Federal Emergency Management Agency (a government agency in the USA) recently estimated that only one-fourth of all US fire departments have a thermal imager (TI). Anecdotal evidence indicates the ratio may be even lower internationally. This article is written for those who are relatively unfamiliar with thermal imaging, and briefly explains how the technology works, as well as how it can be used effectively at emergencies.

THE TECHNOLOGY

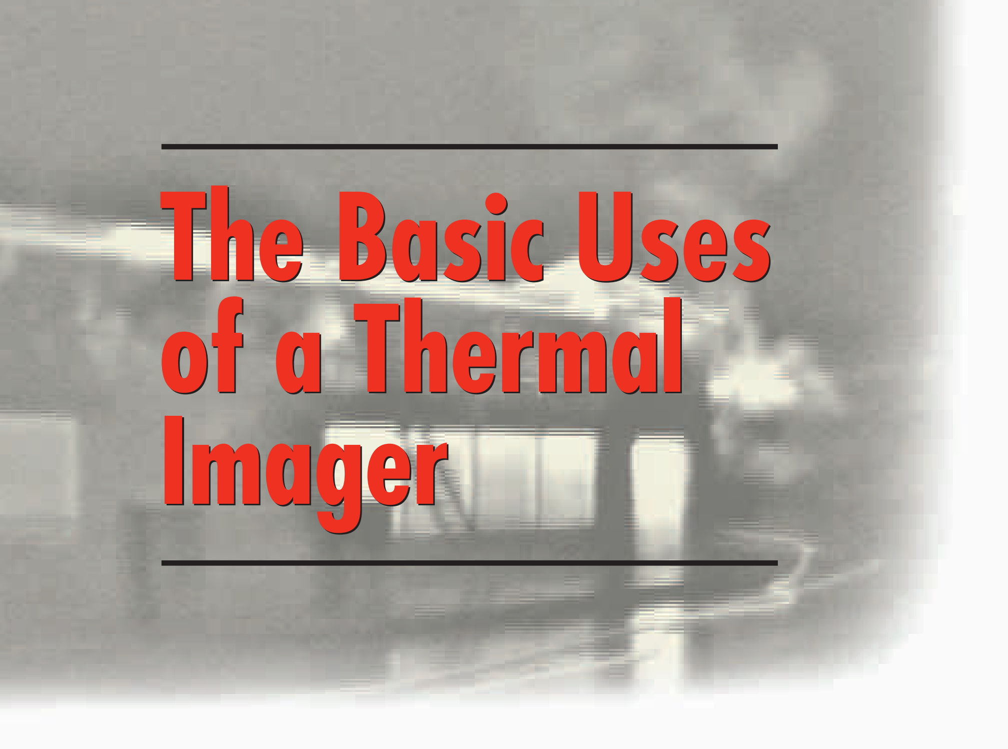
Current fire service TIs use old military technology. This technology detects infrared energy and converts it into a visible image on a display. Modern militaries use infrared (IR) detectors to permit their forces to see and target opposing forces, regardless of the battlefield's light and smoke conditions. The properties that made IR detection valuable to the military also make it valuable to fire services.

IR is a portion of the electromagnetic spectrum, which ranges from gamma rays and x-rays, through visible light, past infrared and microwaves to radio waves. The energy's wavelength determines placement within the spectrum. As the wavelengths vary, so do the properties of the different types of energy. IR is a portion of the electromagnetic spectrum that humans normally perceive as heat.

Visible light has a relatively small wavelength. This wavelength is susceptible to interference from small airborne particles, such as the carbon in smoke or the water in fog. IR has a longer wavelength than visible light. The longer wavelength is not easily reflected by small particles; therefore IR essentially "weaves" through the particles to reach the detector (the IR receiver, also called a focal plane array or FPA).

Another way to understand the difference between infrared energy and visible light is to compare the TI and the human eye. The FPA and the eye are both receivers. They receive energy (IR or visible light) and convert it into an image our brains can interpret. The

> *Visible light has a relatively small wavelength. This wavelength is susceptible to interference from small airborne particles, such as the carbon in smoke or the water in fog. IR has a longer wavelength than visible light.*



The Basic Uses of a Thermal Imager

FPA receives wavelengths of heat energy called “infrared” while the eye receives wavelengths of energy called “visible light.”

FIRE!

Structure fires are the most common and most understood application for thermal imaging. A firefighter can use the TI during *incident size up*. While sizing up the building, Engine 5 evaluates the image from Photo 1. This image clearly shows that high heat has taken the entire right portion of the building. Very high heat near the roof is evident as well, and because this type of building uses steel truss supports, the roof is a safety concern. Engine 5 now knows that the fire is well involved and already attacking the roof supports. If there are no victims inside, the firefighters can choose to operate more safely from the outside.

Firefighters can also use TIs during *fire attack*. By using a TI while advancing its line, a hose team can find it’s the seat of the fire quickly and safely. Because the team can see walls and furniture with the TI, it can move quicker and safer through complicated buildings. In heavy smoke conditions, the TI might even help identify which room or apartment is actually on fire. Firefighters will locate stairs and ladders faster as well.

Ventilation is another aspect of the structure fire where TIs can assist firefighters in doing their jobs more effectively. With the TI on the roof, firefighters can look for the highest heat source to ensure they place any ventilation holes as close as possible. Perhaps more importantly, the TI may help identify compromised roofing before a company is committed to the roof. Holes or gaps hidden by smoke or darkness could be evident on the display.

The most common thermal imaging use is s*earch and rescue.* Several studies have shown that TIs improve search speeds by up to seventy-five percent and can more than double search success rates. For thermal imagers to be effective in search and rescue efforts the TIs must arrive early in the incident and they must come off the apparatus with the firefighters.

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bst after thermal layer falls

their TIs in *overhaul*. By using the TI to identify hot spots, firefighters can focus their overhaul efforts and limit collateral damage. Focused efforts reduce firefighter fatigue as well as reduce on-scene time. For firefighters to gain the most use out of their TIs, they must know how to use them in areas that exhibit "thermal saturation," which occurs when everything in the viewed area is very warm (such as a room after the fire is extinguished). The TI will then display everything in varying shades of light gray and white because everything in the scene is warm or hot. In this situation, firefighters need to properly use the other features of their TIs (such as thermal throttles, EI modes or pyrometers) to identify the hottest spots.

SAFETY!

A key aspect of thermal imaging use is *firefighter safety*. A TI may confirm that a building has truss-roof construction or it may show damaged or missing trusses. Holes in floors and partial collapse, normally hidden by smoke or fire, may be

> *The most common thermal imaging use is search and rescue. Several studies have shown that TIs improve search speeds by up to seventy-five percent and can more than double search success rates.*

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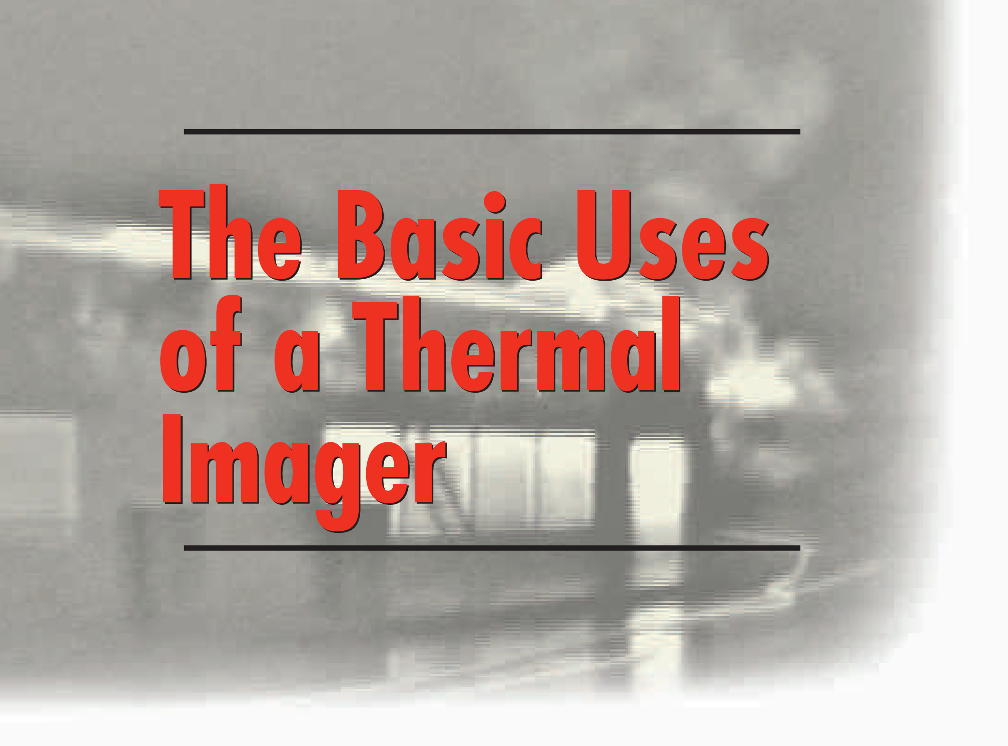


The Basic Uses of a Thermal Imager

visible to a firefighter with a TI. With proper training, firefighters can even identify the thermal layer and possibly recognize pre-flashover conditions. Different IR detectors will "see" the superheated gasses of the thermal layer differently, but firefighters can train to recognize them. Photos 2a and 2b demonstrate how TIs can show superheated gasses, as well as how quickly conditions can change even if firefighters are equipped and experienced with TIs.

These images also demonstrate how firefighters can get overconfident with TIs. By standing, these firefighters are violating a basic rule of firefighting. The intense heat from a diesel-fueled fire not only forces them to the floor, but it drives the firefighters from the area in less than one minute. Firefighters must always remember that TIs do not eliminate the need to follow basic firefighting safety practices.

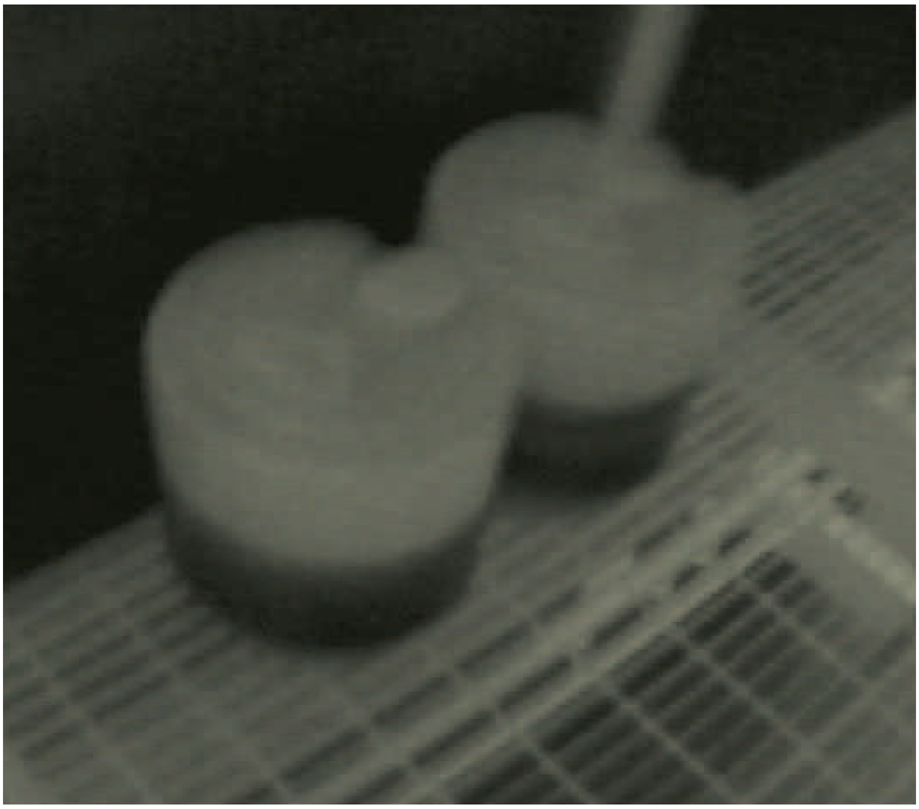
CREATIVITY!

Many fires are outdoors, and many fire departments have successfully used TIs for *wildland (bush) firefighting.* The TI can help officers' track personnel and vehicles, guiding them through smoke or helping them avoid unseen hazards. Used in a helicopter, a TI can help determine the exact fire line and monitor any hot spots. Because IR does not penetrate glass, firefighters using a handheld TI from a vehicle or aircraft must operate it safely through an opening.

Thermal imagers have also assisted during *hazardous materials incidents.* The imager can help track product leaks, identify leaking containers and even determine product levels in sealed containers. Any hazardous material situation that involves temperature changes and product separation can be an excellent opportunity to use a TI. Firefighters should be cautious in explosive environments, however, since there is no thermal imager that is intrinsically safe. Photo 3 demonstrates how a TI can indicate product levels under the correct conditions.

Thermal imagers can also assist with *emergency medical incidents.* One easy application is looking for amputated fingers. Fingers amputated in a factory should have a different temperature than the factory floor, and therefore should be visible on the TI. At motor vehicle accidents, the TI can help find passengers who were thrown from the vehicle by the collision. Creative firefighters have even used thermal imagers to look for heat signatures in car seats to see if they were recently occupied. Just as the technology can help departments locate patients at an accident, it can also help them find a lost child in a forest or an elderly person who wandered away from a nursing home.

Training is another use for thermal imaging. TIs help firefighters monitor interior conditions and participant safety during live-fire evolutions. Safety officers can identify firefighters at risk of high-heat exposure before their turnout gear is damaged or before they are injured by heat or steam. Since most TIs are available with a wireless transmitter, training officers can connect the receiver to a television and video recorder and remotely monitor and record the thermal images. They can review the recording later for addi-



t3 5 gallon pails half full

bst before thermal layer falls

tional learning opportunities.

CONCLUSION

Thermal imagers restore the ability to see in thick smoke or at night, with capabilities limited only by the creativity of the firefighter. TIs regularly demonstrate their value as critical firefighting tools for fire departments around the world. When properly used,

TIs offer tremendous advantages to firefighters at a variety of emergencies, including fires, searches for victims and outside operations. Once firefighters understand the value of thermal imaging, they can request these essential

Jonathan Bastian is the Thermal Imaging Training Manager at Bullard. He leads the training team, whose primary focus is to educate the fire service on the safe and proper use of thermal imagers. Bastian is certified as a thermal imaging instructor by the Law Enforcement Thermographers' Association (LETA), the international public safety organization specializing in thermal imager certification and training. He is also a member of the NFPA Technical Committee on Fire Service Training.

Educated at Brown University and licensed as a high school teacher in Illinois, Bastian served 12 years on the North Park Fire Department (IL), including the last three as a captain. As Health and Safety Officer, he led the development and implementation of the Department's Rapid Intervention Team SOG. Bastian is a certified Fire Instructor I and Firefighter III, and he spent 12 years as an EMT-I/D. He has taught classes on thermal imaging, rapid intervention teams and search and rescue operations.

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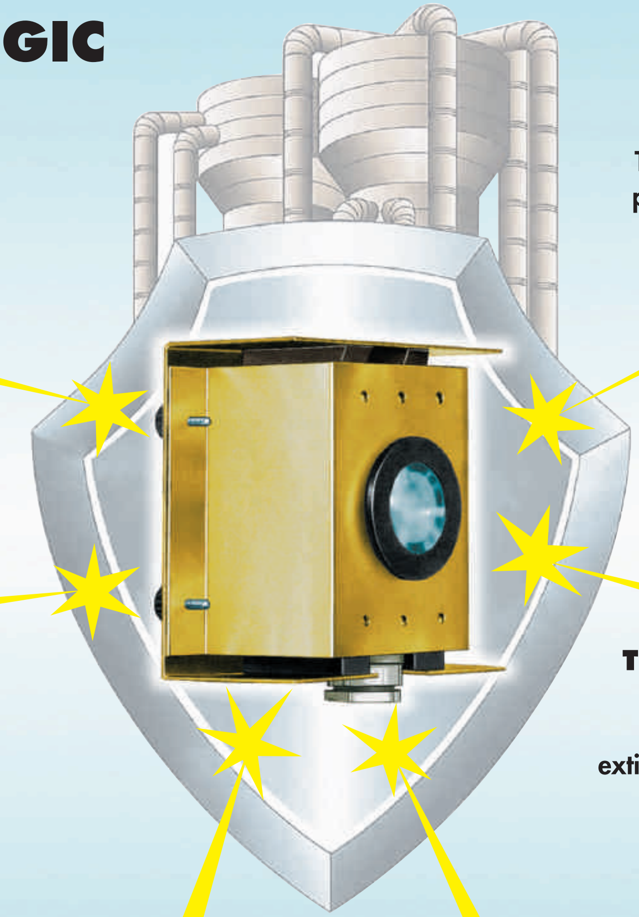

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Very Early Warning Smoke Detection

Why and How it's Applied to Mission Critical Facilities

By Eddie Tieppo, B.Eng, Dip Mgt
Vision Fire & Security
Business Development Manager – Asia Pacific

Mission-critical refers to the operations that are critical to an organisation's ability to carry out its mission. In other words, mission-critical operations are those operations that are essential to an organisations ability to perform its intended function. A mission-critical facility is one that guarantees it will continue to operate, regardless of external conditions. A critical banking facility is an example of such a facility that must maintain operation 24 hours a day 7 days a week. In fact, a minor interruption in service, or loss of data could seriously impact the operational continuity resulting in economic loss especially during high transaction periods.

- 72% of mission-critical applications experience nine hours of downtime per year[2]
- 90% of businesses go bankrupt within two years of a significant failure[1]
- The average cost per hour of downtime for a financial brokerage house is estimated at US$6.5M[3]

Of the companies that experience a disaster but have no tested business recovery plans in place, only one in ten are still in business two years later.

Mission Continuity is assured for facilities through the use of redundant power supplies, redundant mechanical systems and state of the art Fire Protection systems. This paper discusses the Smoke Detection system and its role in fire prevention and smoke contamination within a Mission Critical Facility.

THE FIRE RISK WITHIN TODAY'S DATA CENTER

Today's computing technology is becoming smaller and therefore requires less space, but the heat being dissipated by the digital hardware is also increasing. The result is that the heat density on the chip and in the cabinet is growing at an unprecedented rate. By illustration:

- The average Intel 486 CPU consumes about 10W, the latest Pentium 4 consumes 100W.
- With the processing density and power consumption of blade servers it is not uncommon for standard 47U cabinets to consume in excess of 21kWhr . . . that's a lot of heat!!

The result of this high heat load requires significant cooling via the Computer Room Air Conditioning (CRAC) system to remove the heat generated within equipment cabinets. Failure to cool this equipment will result in equipment over heating and provide the potential for a fire.

Mechanical cooling and airflow movement is an essential parameter within the Fire Detection design and is discussed further in this paper.

THE DETECTION STRATEGY

Within a Data Center the type of smoke generated and the dynamics of the air-flow creates a challenge for the Fire Engineer to design an effective Fire Detection System. It is the detection of smoke that is the most critical part of the Fire Protection System. Detection Systems serve the basic function of alerting occupants within the building of a fire and is used to activate other systems such as mechanical exhaust and Fire Suppression Systems.

The traditional smoke detectors known as Early Warning Smoke Detectors (EWSD) or conventional spot type detectors are of ionisation or photoelectric type. Ionisation type detectors were designed to detect very small particles such as the type produced by flammable liquids. Photoelectrical detectors detect larger particles such as those produced by non-natural materials like PVC. Given this fact photoelectrical detectors are more suitable to detect the fire type we expect within a computer facility, however there are other factors contributing to photoelectric detector's deficiency within these environments.

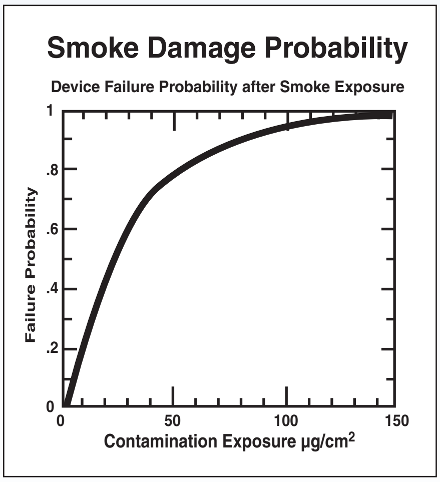
Within the Fire Industry detectors are categorised as Early Warning Smoke Detection (EWSD) and Very Early Warning Smoke Detection (VEWSD). In fact some people use these terms very loosely and do not differentiate the two correctly. An EWSD system provides detection of a Fire Condition prior to the time that it becomes threatening to the occupants of a building. Generally this is the time that smoke is visible. Lets use the example of a paper basket fire within a standard office. Seconds after the paper has ignited, smoke will generate and rise to the ceiling. This visible and hot smoke will eventually enter the smoke detection chamber and trigger the alarm to alert the occupants that a fire has commenced. In contrast if a computer terminal within the same room had a fault within the electronics resulting in a thermal event, it may smoulder for hours before a flame ignites. We refer to the smouldering stage as the incipient stage to a fire. During this incipient stage the human eye will not see the particles but may smell them. EWSD are not sensitive enough to detect smoke at the incipient stage of an electrical type fire. Only a VEWSD will detect an incipient fire and thus the term "VERY EARLY WARNING". This stage of a fire could last for hours or even days.

Spot type smoke detectors are 'passive' detectors in that they wait for smoke and rely on the airflow to transport the smoke to the detector. Therefore their performance is affected by high airflow. Since the rate of smoke generation in a smouldering fire is relatively small, and the airflow velocity in the room is quite high, the movement of smoke is dominated by the airflow of the mechanical systems. Furthermore the smoke generated during the incipient stage is not hot therefore there is very little thermal lift. This often restricts smoke movement directly to the ceiling, where spot type detectors are located, causing the smoke to dissipate more widely. The aspirated smoke detection system is 'active', constantly sampling the air from multiple points throughout the environment and therefore is not totally dependant on thermal energy to transport to and enter the smoke detector.

SMOKE CONTAMINATION

So why is the detection of smoke at the earliest possible stage important? Because the biggest risk to the continuous operation within a computer room facility is the smoke damage to electrical equipment, not the fire. In fact according to the USA Federal Commission of Communications, 95% of all damage within these facilities is non-thermal.

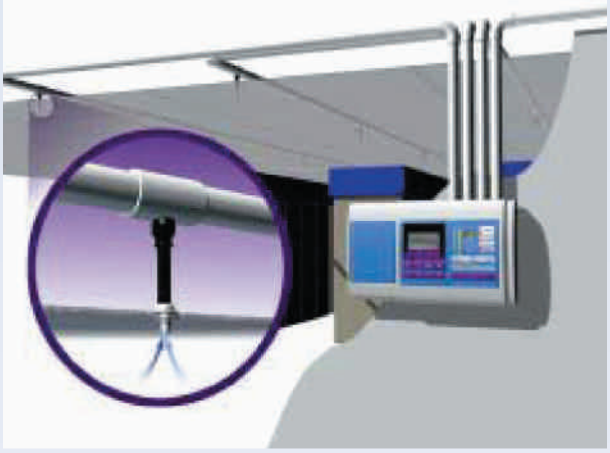
The by-products of smoke from PVC and digital circuit boards are gases such as HCL and these gases will cause corrosion of IT equipment. The graph bellow depicts the damage that can be caused by the increase of particulates within the computer room. Even at 16 micro grams there is moderate corrosion with long-term effects on Electronics, at 30 micro grams the corrosion is active and the effects are short term. Above this the damage to equipment is detrimental to ongoing performance.



Contamination and failure probability[4]

ASPIRATED DETECTION

Aspirated smoke detection systems are quite different from conventional spot type smoke detectors. Aspirated systems typically comprise a number of small-bore pipes laid out above or below a ceiling in parallel runs, some metres apart. Small holes, also some metres apart, are drilled into each pipe to form a matrix of holes (sampling points), providing an even distribution across the ceiling. Air or smoke is drawn into the pipework through the holes and onward to a very sensitive smoke detector mounted nearby, using the negative pressure of an aspirator (air pump).



Air Sampled through a capillary and sample point

HOW MUCH SMOKE SHOULD WE DETECT?

Obscuration as a unit of measurement has become the standard definition of smoke detector sensitivity used in the industry today. Obscuration is the effect that smoke has on reducing visibility. Higher concentrations of smoke, result in higher obscuration levels, lowering visibility.

Typical Smoke Detection Ratings for smoke detectors:

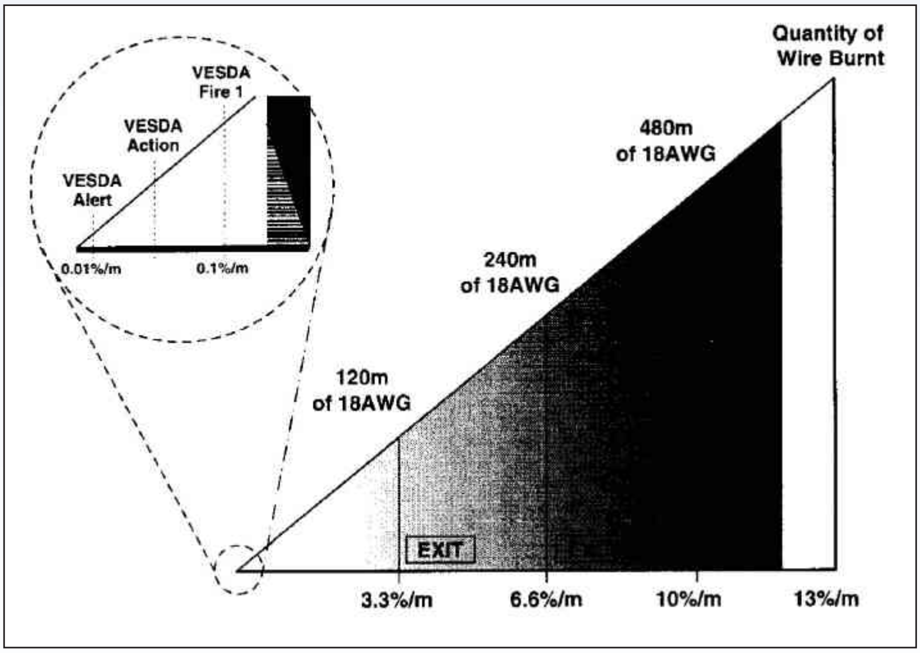
- Photoelectric: 3.0–12% obscuration metre
- Beam: 3.0–7.0% obscuration per metre
- VESDA: 0.005–20% obscuration per metre

Test performed by Vision Fire & Security have shown that by burning a measured length of wire within a controlled room we can determine the resulting Obscuration/m. In a 1,000 square metre room with a ceiling height of 4.5m, the insulation from approximately a 480m length of 18 AWG wire would have to bum to produce 13%/m obscuration throughout the room.

Whereas burning of only a 0.3m length of the same insulation would produce approximately a 0.0156 obscuration per metre level of smoke throughout this room.

The amount and colour of smoke created in a room during a fire is dependent on the type and amount of material burned. Smouldering combustion of a printed circuit board may produce a heat release rate of one or two Kilowatts and the heat release rate of a single resister is as low as 10W. By comparison the heat released from a paper basket fire may be between 2 to 4 Kilowatts (UL standard paper burn (3 sheets) is 4kW. The fire size to be detected must clearly be less than or equal to 1.0kW within a Data Center if we are to measure the performance of a VEWSD.

Current testing practice within telecommunications and computer rooms today use a practical on site test to determine the effectiveness of a Fire Detection System. In the past system testing was conducted with a can of smoke that was sprayed into the end of pipe network or into the point detector to determine if the system was working. But this test does not check the system's performance to a real small fire scenario, which is the benchmark for VEWSD.



Smoke Obscuration measured based on a Burning wire within a 1000m² room

A common test used today is the BS6266 "Code of Practice for Fire Protection for Electronic Data Processing Installations". This test involves electrically overloading a short length (1 or 2 metre) of PVC-coated wire which produces a small amount of light grey smoke barely visible and simulates a smouldering fire of approximately 100W.

Typically, the test is performed within the room during the commissioning process and the VEWSD should give an alarm indication within 60–120 seconds or what ever the objective for the design.

Computational Fluid Dynamic Modelling (CFDM) used by Fire Engineers to determine the effects of such fires within High-Airflow environments can calculate the theoretical growth of incipient fires smoke development and the contamination that results from such smoke. Such models can be used to determine the level of contamination (mass of particulate per metre^3) for any size of fire. This is useful in estimating the amount of contamination to which IT equipment is exposed during various fire conditions. As shown in Graph 1 the contamination exposure caused by fires will increase the probability of IT equipment failure.

Use of a VEWSD detector to detect such contaminants can reduce the risk of such damage occurring. In many cases the contaminants are present at very low levels, often as a result of high background smog/smoke levels, often introduced from poor quality air during the use of 'economy cycle' HVAC. Without the use of VEWSD the low levels of these contaminants can go unnoticed for long periods of time causing insidious but permanent damage.

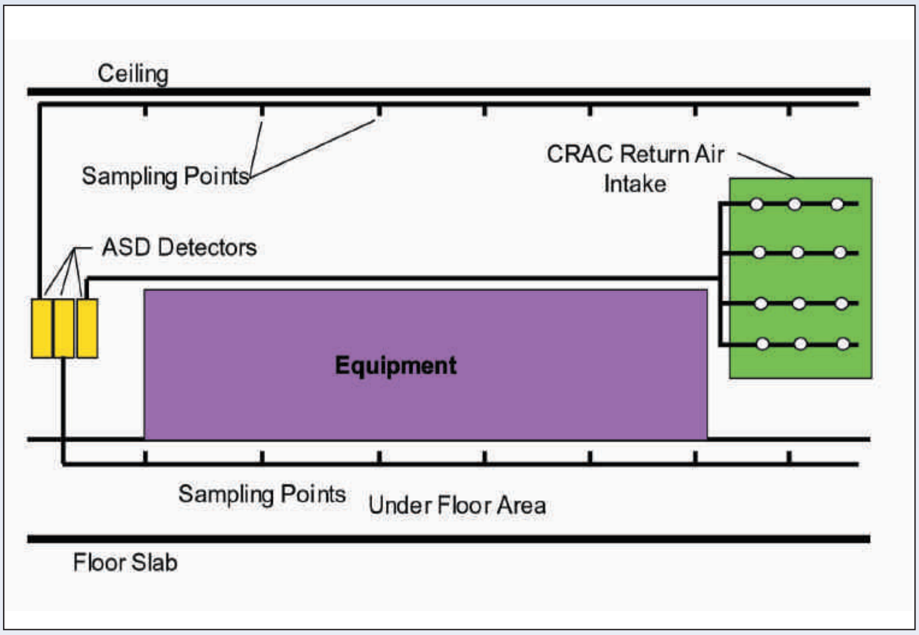
In addition, the use of the event log of a sophisticated VEWSD can be used to support a warranty or product replacement claim on an equipment vendor where equipment fails within its warranted terms of use. This is especially important where the vendor's warranted terms of use reference the quality of the environment rather than the deposition of contaminants on the equipment, as is often the case.

BEYOND THE CONVENTIONAL DESIGN TECHNIQUES

Although the design of fire protection systems has primarily been based on traditional prescriptive fire codes, there is an increasing emphasis on performance-based codes that address individual environment requirements. Performance-based design determines the best fire protection system by assessing the function, risk factors, and internal configuration and conditions of a specific environment.

When designing a Fire Detection System for **VERY EARLY WARNING** the designer must consider the following:

1. The airflow characteristics and the air change rate within the room
2. The coverage area per detector or sample point
3. The sensitivity required per sampling point
4. The room size and characteristics – raised floor, tall ceilings etc



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5. The annunciation of emergency response systems
6. The activation of mechanical control systems such as air extraction and suppression systems

The detection system must be designed for conditions when the Air Handling System is either operational or out of service.

The following example describes the detection method on the CRAC return air path, relevant in circumstances where the CRAC is operational. This method of VEWSD is suitable for rooms that use EWSD spot type detectors as the detection scheme in circumstances where the CRAC is out of service.

The following example shows the ASD pipe network configured for both circumstances; where the CRAC is operational and out of service. The sampling pipes on the ceiling and within the floor void are used for detection where the CRAC is out of service. The pipe used to detect smoke across the return air path is used for detection where the CRAC is operational. This design method is suitable for rooms where the ceiling height is not tall and room is small in area.

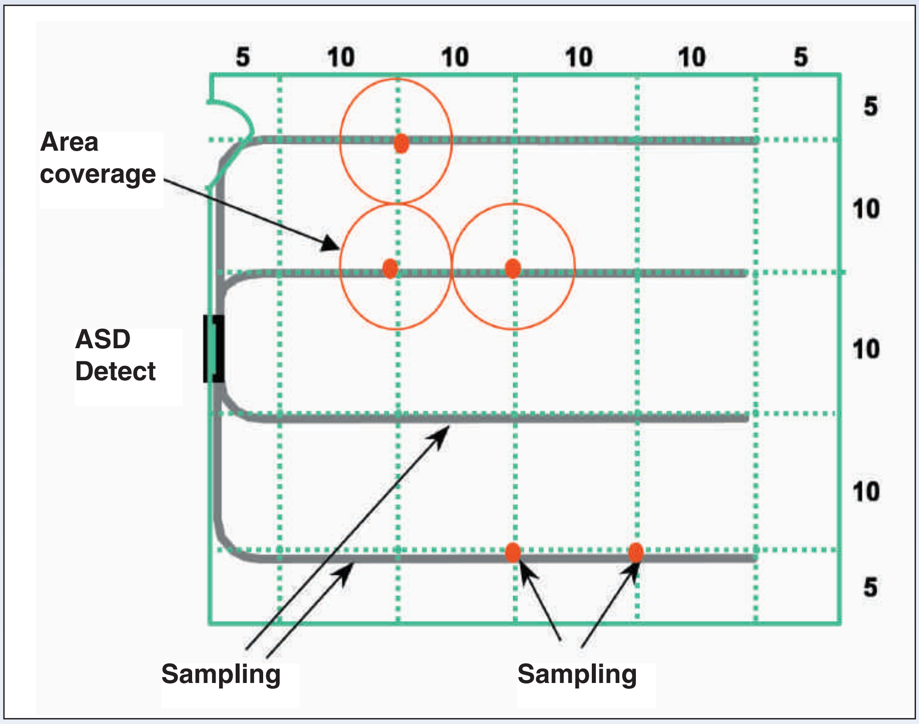
For large rooms with High Airflows it is recommended to use a combination of both on ceiling detection, underfloor detection and return air.

COVERAGE AREA

The area coverage of the detector is a very important criterion of the design. This is true from both a performance and cost-effectiveness perspective.

Below is an illustration of a grid layout for an ASD detector for a 2000 m^2 area (this is the maximum area coverage permissible within the codes, BS, AS, NFPA). The sample points of an ASD detector is treated the same as a spot type detector within most prescriptive codes. You can see below that the area coverage for a sample point is effectively the circle or close to the square around it, which is 10m x 10m = 100m^2 (this illustration below is designed as per AS1670 and would be suitable for a low airflow environment). For ASD applications in High Airflow environments, we can decrease the area coverage for the sample point by adding more holes and making the distance between each pipe less.

The prescriptive Codes and Standards today describe detection techniques for on ceiling detection. But new codes such as Draft NFPA 76 "Standard for the Protection of Telecommunication Facilities" is the first code that uses a prescriptive and performance based approach for the Fire Protection of Telecommunication facilities. Within this code it specifies both the area coverage as well as the sensitivity of the detector. Presently the Draft of the NFPA 76 Standard for the Protection of Telecommunications Facilities document requires that "*Every type of sensor and port installed in a space shall be limited to a maximum coverage area of 200 sq. ft. (reference page 51, section 6-5.3.1.2*) Exception: When (2) levels (high and low) of ports or sensors are provided, each level shall be limited to a coverage of 400 sq. ft. or less per port or sensor.*



NFPA 72 "National Fire Code for the USA" recommends the area coverage for spot type detectors to be reduced within high airflow environments to as low as 11.5 m^2 per detector for rooms that have 60 air changes per hour.

British Standard – BS 6266 (1992), Section 5.2.5.1 Detector Spacing – General – " *From the point of view of automatic fire detection, EDP areas present fire risks quite different from those in many other premises. The concentration of high value equipment, sensitive to damage by even a small fire or smoke, and particularly the high potential consequential losses, make it important to use close spacing of detectors. Detector density should be high enough to enable the smallest fire to be detected quickly without unduly increasing the false alarm risk. A reason for a higher than normal density of detectors is the influence of the air-conditioned system, which dilutes the smoke being produced by fire."* Section 5.2.5.2 *Point Detectors – "Recommended area coverage per detector for the different location zones are given in table 1. As follows:* EDP equipment room (ceiling height above 3 metres), require a maximum spacing of 15-25 square metres (150–250 square feet).

As well as codes there are insurance companies such as Factory Mutual who specify in their Property Loss Prevention Data Sheet (5-48) for Automatic Fire Detectors page 7 "A maximum coverage of 200 sq. ft. (20 m^2) per detector may be necessary where room air is changing at a rate of 20 air changes per hour or 100 ft/min (0.5m/sec).

So the message is that more detectors should be used in high airflow environments to increase the chance of seeing a fire however, this requirement can be off-set by the use of a VEWSD which can support a large number of sampling points in a single pipe network.

SENSITIVITY OF ASPIRATED SMOKE DETECTION

Although this reduced spacing will increase the probability of smoke being detected, it does not determine if the smoke generated has an obscuration density high enough to trigger an alarm. Therefore the sensitivity of the system is also fundamental to the design of the VEWSD system. The sensitivity of the Aspirated Detection System's sampling point is extremely important to ensure consistent and sensitive detection within the zoned area is achieved. But what codes and standards do not take into account for Aspirated Smoke Detection Systems is their ability to use Cumulative air sampling within an environment.

Cumulative Air Sampling refers to the way the Aspirated Smoke Detector samples smoke over the network of sampling points allowing each to contribute to the smoke being sampled at the detector. Within a high airflow environment this phenomena becomes very useful since particles of smoke are spread through the room allowing the Cumulative sampling effect to take place.

Take the example of a 200 square metre room with 10 sample points on the ceiling. If the detector sensitivity is set to 0.1% Obscuration/m this effectively makes each sample point's sensitivity 0.1 x 10 = 1.0% Obscuration/m. That is, if only one sample point was exposed to smoke it would require 1.0% Obscuration/m to trigger an alarm. This is because the fluid mechanics of the model takes into account dilution caused by the other holes.

Using the same example if smoke enters three holes the effective sensitivity required to trigger an alarm is 0.1 x 10 divided by 3 = 0.33% Obscuration/m. Clearly, cumulative sampling allows much lower levels of smoke, and therefore very early warning to be detected. If the same room was designed with EWSD and each detector was rated at 5% obscuration/m the alarm would only trigger once the smoke density has reached this point throughout the room or at one detector.

IN-CABINET AND INTEGRATED-EQUIPMENT DETECTION

Interest is developing regarding the application of ASD within data racks & enclosed equipment cabinets and integrated in specific equipment or assets. It is desirable to fit ASD within these cabinets because in some circumstances it would not be acceptable for smoke from a fire within the cabinet to 'breech' the cabinet, enter the mission critical facility, contaminate other systems or processes and possibly activate main alarms and suppression systems.

In-cabinet smoke detection and action enables an excellent very early warning solution because:

1. The sampling is performed closest to the source of the fire, before dilution, which allows earliest detection
2. Sampling within the enclosure allows clear identification of the source of the problem. This "addressability" reduces time, effort and error in identifying and remedying the problem.
3. The detection occurs before any spread of the risk; loss can be minimised:
    - Smoke is not allowed to contaminate or otherwise affect other systems in the data centre
    - Compartmentation ensures that in worst cases the Estimated and Possible Maximum Loss and Business Interruption estimates are minimised (for insurance assessment)
4. The background dust and smoke levels within sealed enclosures is relatively consistent. Also, the airflow dynamics within a sealed enclosure can be predicted with relative confidence by computational fluid dynamic models. This ensures that detection systems can be designed, built and commissioned with confidence of their efficiency and performance.
5. Fire responses can be more automated, and cost and downtime from fire responses, such as use of suppression, is reduced.
6. Better control of the issue management and escalation processes is possible – an alarm can be routed to the data centre manager as an "environmental alarm", rather than reporting via the main fire alarm system. This staged response to a fire threat allows IT staff investigation and possible intervention, an ability to move processes or data from problem equipment, action such as power-down of problem equipment and, if necessary, suppression of an escalated fire. Such a staged response will often negate the need for suppression to be fitted or, if fitted, will negate the need for expensive suppressant to be released.
7. Cause & effect is localised, ie. fire controls used are specific to the cabinet rather than the room. Common are a protection systems means that the common area is unprotected after suppression has been affected until the system is re-charged.
8. Integration with existing communications systems is possible – remote and centralized monitoring and maintenance (especially for unmanned or automated facilities), eg over LAN, MAN, WAN becomes cost effective. Also, coupling advanced smoke detection with a full suite of environmental monitoring systems (power loss, access-control, security, temperature, water loss, humidity etc) offers a number of synergies.

CONCLUSION

Due to the huge financial loss and potential business risk, a Mission Critical Facility cannot risk downtime especially of the size and duration potentially caused by fire and smoke contamination. The most important system that contributes to the prevention of Fire and Smoke Damage is a Very Early Warning Smoke Detection system, which meets the performance objective to detect smoke at the very early stages of a fire.

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4. 2nd International Fire Protection Seminar Buenos Aires 1999 – Telecommunication Facilities.
5. BS6266
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8. Factory Mutual

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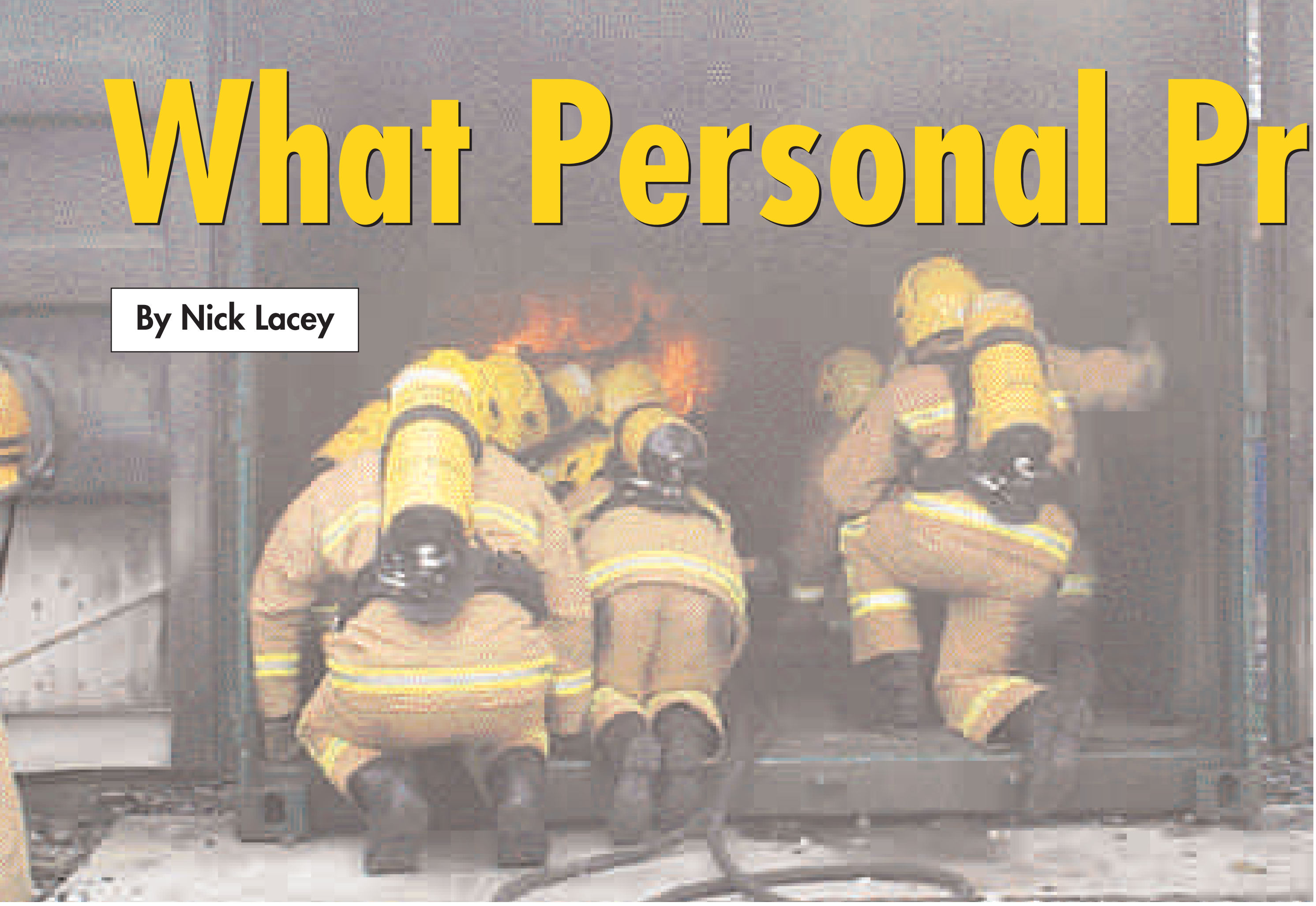

By Nick Lacey

IT SEEMS A LIFETIME AGO since I struggled through the teeming mass of eagerly expectant taxi drivers, which were forming the running gauntlet from *Tat Son Nhat International Airport*, Vietnam.

I had finally arrived after my epic journey, jet lagged, bleary eyed and disheled, only to be met by a torrential downpour. "Good Morning Vietnam"! But where's the sun? I had imagined to be met with the warm embracing tropical breeze of this far-flung country, not raindrops the size of golf balls leaping two feet into the air off the steaming tarmac. The whole scenario could not have been further from my imagination.

The date was the 20th August 1998, and I was about to get my first taste of the Vietnamese 'Safety culture'!

I had to travel the two and a half hour journey by road from Ho Chi Minh City to the southern most point of Vietnam, a place called Vung Tau, which was to be the departure point to my new home for the next six weeks offshore. This was a Floating Production Storage and Offload facility, better known to those in the business as a FPSO (Pronounced Fipso). I was to find myself forty minutes by Helicopter offshore of South Vietnam. I still had my journey by road to overcome first, and boy what an eye opener!

Teams of local roadwork 'Specialists,' were busy repairing some of the many potholes to be found en route. Some of these were over eighteen inches in depth! These workers were dressed in all their best Personal Protective Equipment (PPE). This consisted of vest, shorts and well worn "safety boots". Better known to Expats as flip-flops. One worker was operating a pneumatic drill, breaking up huge heavy chunks of tarmac whilst his colleagues were removing them, also attired in their 'flip-flop safety boots.' What PPE? Was this the standard of safety I was to expect? Surely these workers were a one off; these guys cannot be for real; could they?

I was then treated to a spectacular show of balancing skills, which the Moscow traveling circus would be proud to possess and all whilst riding on a moped, as along with bicycles, this is the favored form of transport in Vietnam and much of South East Asia. Of course the whole operation is carried out, minus any head protection, leathers or protective clothing we are accustomed to, and of course wearing the standard 'safety flip-flops.' I watched amazed as two men carried a plate glass window, lodged between them on a clapped out rusty moped. Then a man with an arm chair, part of a three piece suite, which was strapped to his back with the sheer weight forcing his bony chin onto the handlebars of the rickety rusty bike. Then to cap it all, a smiling family of six, complete with babe in arms and of course well-worn, designer 'Safety Flops'. I never did get to see a party of seven! Just what have I let myself in for? Surely the locally employed work force offshore would be more safety conscious than this? Surely those guys offshore will be totally different?

Looking back over the last 30 years, I have learned an awful lot about Safety in general, and the various types of PPE available.

Safety cultures differ dramatically throughout the countries of the world. Having worked in many areas of the globe and currently in West Africa, it is clearly apparent that International standards and stringent regulations for the wearing and use of PPE are not only totally disregarded, but also completely unheard of!

SO WHAT EXACTLY IS P.P.E.?

It's a last line of protection, the very last resort. The book definition of PPE is; '*Any device or appliance designed to be*

tective Equipment?

worn or held by an individual at work for protection against one or more health and safety hazards'.

PPE *really is* the last line of defense. The majority of employers know that PPE, if worn correctly, can protect employees from the risk of injury by creating a barrier against workplace hazards. It is not a substitute for sound engineering controls and documented workplace procedures. It should be worn and used in conjunction with these controls, if there is no other way to protect the worker. We cannot protect the workforce purely by providing them with various items of PPE.

Which item should they choose? How should it be worn? Does it afford suitable protection for the task in hand? Far too many employers still believe *"it is someone else's problem" and "It is not my fault if the employees do not wear it, at least we provide it."*

I recently attended a safety seminar in Singapore, whilst assigned to a new FPSO conversion. During the course of the seminar, it came to light that a fatality had occurred in the offshore industry to an employee who was actually in the process of putting on an item of PPE. Inconceivable; yet nevertheless true. The protective item happened to be a safety harness, and the unfortunate individual was in the process of donning the harness whilst walking between rotating equipment. The harness became entangled in the equipment and pulled the unsuspecting individual into the rotating component, resulting in fatality.

Many smaller incidents involving PPE spring to mind. For instance a young Vietnamese welder sustaining a superficial burn on the back of his wrist, the size of a watch face, as a result of a hot piece of welding slag dropping inside his gloves. Was it incorrect PPE for the job? Was he even aware that he had the wrong gloves on for the task he was undertaking? He *should* have been wearing correct welding gauntlets, but who should provide this equipment? Who was responsible for training him? Who was his direct line Supervisor?

SO WHAT ARE THE GUIDELINES?

It's not enough to merely provide PPE and expect employees to know how it is worn correctly. Management are accountable and directly responsible for ensuring a duty of care to their employees. The bad old days of "But we've done it like this for years!" are now thankfully gone. The PPE at work regulations 1992 often referred to as part of the "Six pack" clearly place a duty of care on employers and the self-employed to provide serviceable and suitable PPE, at no cost to their employees. One only has to pick up the daily papers to see that today companies are heavily fined if a breach of these regulations take place and this can also rise to civil claims against the employer.

The Personnel Protective Equipment at Work Regulations 1992, clearly outline these requirements. A new regulation has recently been included to place a duty on all suppliers to supply safe PPE. Contravention of this requirement is now an offence under the consolidated regulations and extends to the retailers and the suppliers of PPE. The design of equipment and clothing must be of a safe design and construction for the work to be performed and easily maintainable. Various regulations concerning PPE maybe country specific to the region you are working in, so it is worth ensuring that the regulations you are following are applicable to the country in which you are working.

So what exactly are the responsibilities towards PPE?

RESPONSIBILITIES

Employers – They have primary responsibility for the implementation of the PPE Program in their work place. This includes:

> *A new regulation has recently been included to place a duty on all suppliers to supply safe PPE. Contravention of this requirement is now an offence under the consolidated regulations and extends to the retailers and the suppliers of PPE.*

- Conducting workplace Risk Assessments or Job Safety Analysis (JSA's) to determine the presence of hazards, which necessitate the use of PPE.
- Conducting periodic workplace inspections and reassessments of hazards.
- Maintaining documented records on all hazard assessments.
- Providing training and technical assistance to Supervisors on the proper use, care and cleaning of approved PPE.
- Providing guidance to the purchaser or Supervisor for the correct selection and purchase of approved PPE.
- Periodically reevaluating the suitability of previously selected PPE.
- Reviewing, updating and evaluating the overall effectiveness of the company PPE program.

Supervisors – Have the responsibility for the implementation of the PPE Program in their designated work areas. This includes:

- Providing appropriate PPE and making it available to their employees.
- Ensuring employees are trained on the proper use, care, and cleaning of PPE.
- Maintaining records on PPE instruction and training.
- Supervising their staff to ensure that the elements of the PPE program are followed and that employees properly use and care for their PPE.
- Notifying the authorities when new hazards are introduced or when processes are changed or added.
- Ensuring defective or damaged equipment is immediately replaced.

Employees – They also have responsibility for:

- Following the requirements of the company PPE program.
- Always wearing PPE as required.
- Attending required training sessions.
- Caring for, cleaning and maintaining PPE.
- Informing the Direct line Supervisor of the need to repair or replace damaged or defective items of PPE.

TRAINING

Careful consideration should be given to the comfort and correct fit of PPE in order to ensure that it will be used. Protective devices are usually available in a variety of sizes, so care should be taken to ensure that the right size is readily available and selected for use. Any employee required to wear PPE shall receive training in the proper use and care of PPE. This also includes the direct line Supervisors. Training should include, but not necessarily be limited to:

- When PPE should be worn.
- What PPE is necessary for the particular hazards in the workplace.
- How to correctly don, adjust and wear the PPE.
- The limitations of the PPE.
- The proper care, maintenance and useful life expectancy.

After training the employees shall demonstrate that they understand, the components of the company PPE program and that they know how to use the PPE properly. Written records are essential and should include the type of training provided, names of all persons trained and the dates the training occurred. These records should be kept for at least 3 years.

PEER PRESSURE VERSUS OPEN SHOP?

A problem still exists in many companies, especially in third world locations using National staff, when individuals require PPE replacement or even initial issue. Employees are often reluctant to approach their Supervisors or managers to replace defective items of clothing or equipment. In order to prevent high consumption, and the associated expense to maintain stocks of replacement PPE, a fine line needs to be drawn between an "*open shop*" policy and the 'third degree' in-depth scrutiny as to why the individual wants the PPE replaced, without deterring them from asking for replacement.

It is common in these situations for many companies to operate an open, no questions asked, "hand in" replacement program after initial issue. This allows better controls to be kept on the consumption/cost of the PPE, the defective or old PPE can be disposed of correctly, and additionally as the used or worn out equipment is collected it can help with the analysis of how certain types/models of PPE are actually withstanding the application duties in the workplace.

RIGHT KIT FOR THE RIGHT JOB?

So how do we know that we have the right PPE for the task in hand?

Although PPE may be provided, it is essential that the Supervisor or person responsible for issuing the equipment is aware of its limitations. As an example there are numerous types of gloves available in today's market, but are the right type chosen for the correct task in hand? One type of glove will not work in all situations. Gloves that can protect against chemicals may afford little protection against abrasions, cuts, lacerations or punctures or harmful temperature extremes. Fire suit gloves that are used in a domestic capacity might not afford suitable protection for crash rescue purposes?

Many years ago in the mid seventies, during a training exercise, a colleague of mine was burnt quite severely on both hands during a drill. The gloves he was wearing gave very little protection for the situation he was faced with. He was caught in a flash back resulting in burns to both hands.

So careful consideration is essential in ensuring the right PPE is selected for the task in hand. Consideration should also be given to the comfort and fit of PPE in order to ensure that it will be used. Protective devices are generally available in a variety of sizes, so care should be taken to ensure that the right size is selected.

If a Fireman is employed in a domestic role and is then switched to airport duties, does he need to also switch to a close proximity suit? The answer of course comes back to sound management, documented procedures and good supervision backed up by methodical training methods.

Nick Lacey has over 30 years experience in fire fighting, fire prevention and aircraft crash rescue procedures, having served in the Royal Navy's Fleet Air Arm for 23 years as an Aircraft Handler. During this time Nick was employed on Aircraft Carrier flight decks and shore side in the Naval Air Command Fire Service, where he finished his career as Fire Chief. On leaving the service, Nick moved into a Health and Safety role having studied the NEBOSH general Certificate in Health and Safety and attended numerous courses for the offshore industry.

Nick is currently employed as Safety Officer onboard a FPSO producing over 110,000 barrels of oil per day. He is responsible for all aspects of safety and training onboard and is also the Helicopter Landing Officer (HLO).

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Having consumed its stock of protein and fluoro-protein foam agent to battle earthquake-initiated fires involving flammable liquid storage tanks, Idemitsu Kosan Co., Ltd. – Hokkaido Refinery, located near Tomakomai, Japan, called on the marketplace for emergency replenishment of foam stocks. Tyco Fire & Security,'s Fire Suppression Business and ALERT Disaster Control of Singapore met the challenge to begin shipping ANSULITE® firefighting foam agent within a 24-hour deadline.

A powerful earthquake, which registered 8.0+ on the Richter scale, rocked Japan on 26 September 2003 and with subsequent aftershocks was responsible for major storage tank damage and fires at the refinery, located approximately 750 km (460 miles) north of Tokyo. Idemitsu Kosan immediately initiated its Emergency Response Plan and together with the assistance of National Authorities and regional mutual aid contingencies, was successful in containing and controlling the event. The operations included a tank containing crude oil, which experienced an initial full rim seal fire and subsequent structural loss due to manifold separation, resulting in a fully involved bund fire. A second tank containing Naphtha experienced a total product, roof and eventual structural loss due to a fully involved surface fire. In addition, the facility experienced an estimated forty-three roof failures within open top and coned roof storage tanks exposing considerable volumes of product to atmosphere and potential ignition sources. The magnitude of the operation set a previously unrecorded precedence for such an occurrence within the region. In a gallant attempt to extinguish the fires and maintain vapour suppression during product transfer operations, emergency stock and mutual aid reserves of available foam inventory were expended.

Steve Hansen, Foam Marketing Manager, Tyco Fire Suppression Business (second from right) discusses the packaging and loading of foam tote containers with Nippon Cargo Airlines personnel at Chicago's O'Hare International Airport.

In order to ensure delivery of proven fire suppression resources and products, Idemitsu Kosan placed an emergency order with ALERT Disaster Control for 500,000 litres (132,000 gal) of 3% AFFF (aqueous film-forming foam). The order was split with an initial order totalling 200,000 litres (52,835 gal) of AFFF. On 03 October 2003, ALERT Disaster Control awarded approximately 100,000 litres (26,350 gal) of the initial order to Tyco Fire & Security with the stipulation that the order would begin shipping within 24 hours. Working around the clock, Tyco's Fire Suppression manufacturing operation in Marinette, Wisconsin, USA shipped 27,000 litres (7,133 gal) of ANSULITE 3% AFFF the same day and completed the entire order by 06 October 2003. The product was transported to Chicago for airfreight to Japan by Nippon Cargo Airlines (NCA).

After successfully delivering the initial order, Tyco's Kevin White, Director of Asia-Pacific Sales commented: "I had no doubt we were up to the challenge... and it paid off. As a result of our fast performance, we have been awarded the balance of the contract. That's another 300,000 litres (79,250 gal) of foam, three times the initial Order!" Through ALERT's extended contract for the supply of additional foam stocks, Tyco received the second order on 10 October 2003 with a required lead-time of seven days. The last shipment was delivered to NCA on 16 October 2003, one day early.

Our partners in this unique project, ALERT Disaster Control, continue to assist Idemitsu Kosan through the provision of on-site technical consultation, training in leading firefighting technologies and application methodologies, and additional services and product sales encompassing transportable firefighting pumps, support equipment and systems.

Shortly after returning from Japan to the ALERT (Asia) base of operations in Singapore, Mike Allcorn, Managing Director, stated proudly, "During our Customers moment of crisis, we were grateful for the opportunity to work together with their Management and plant operations personnel and fulfil their fire protection requirements in a professional, expedient and cost effective manner. ALERT's global emergency response and integrated risk management service capabilities, combined with the vast resources of the Tyco Fire & Security network and systems support from our associates at Williams Fire & Hazard Control, clearly provided the optimum fire suppression solution for our Customer."

EMERGENCY PREPAREDNESS – Fact or Fiction?

What have YOU done lately to assess your competence?

EMERGENCY Protocol must always remain committed to **prevention.** In fact, as responsible members of the business community, this is the only acceptable method of protecting our personnel, the environment, assets and our reputation. Yet, it remains an often-tragic revelation that far more monies are expended in terms of actual emergency response activities and litigation than for preventative measures (training, drills, audits, etc.). It has become a sad realization that many companies today have lost focus with the basics of emergency preparedness. Applied logic offers no other excuse for what we witness on a daily basis, and while it would be nice to limit this to one particular industry, it is endemic. Remember, everyone is a potential casualty, not everyone is a potential survivor.

No company today is immune to man-made or natural disasters. Therefore, a well-organized and tested emergency response plan is vital. It is imperative that we prepare ourselves to deal with any and all potential problems. As such, it becomes critical that all hazards have been identified and subsequent risks assessed and controlled. World events continuously remind us that even though the probability of occurrence may be extremely low, it will not be impossible. We also note that the degree and speed of escalation of an incident is inversely proportional to the level of preparedness. **Hence the question, are we really prepared to respond? Are we simply competent on paper, or are we truly proven competent?**

Our primary response to an event must deal with safeguarding personnel and the environment. Secondary response provides for protection of assets in addition to directing our efforts to promote post event recovery and ultimately the preservation of our reputation. To accomplish this, each and every operational unit must be responsible for maintaining their relevant level of emergency response infrastructure. Likewise, Management, at defined levels throughout the organization's hierarchy, must also possess the ability to provide the requisite support (Emergency and Crisis Management). The defined infrastructure must clearly detail the roles, responsibility, accountability and authority that shall be adhered to in an emergency situation. Subsequently, each operational unit must be provided with the resources to deal effectively with any event that arises. Resources must include communication links, equipment, trained personnel and support services.

To gain an accurate picture of an organization's level of emergency preparedness, specific areas must be assessed using a well-defined and systematic approach. These include, as a minimum:

- Pre-incident Planning
- Resource Allocation
- Emergency Response Teams
- Essential Services
- Transportation
- Emergency Center and Communication
- Interaction with Mutual Aid Partners and Cooperating Agencies
- Salvage and Restoration Operations (Business Continuity)

The philosophy to be used when designing and ultimately conducting the assessment dictates that for every action initiated during an emergency situation there will be a reaction.

For example, if we delay calling the appropriate technical specialist, control of the fire may be lost. Likewise, if we act without forethought and planning we may inadvertently cause the situation to escalate.

Emergency Preparedness assessments must combine the attributes of both test and learning experience. The experience should always strive to provide a realistic atmosphere for the participants without placing them in a "no–win" situation. If participants become frustrated due to unrealistic or unfair escalation then the environment loses the aspects conducive to learning. However, if participants are unable to respond properly due to inherent faults in the system it must be made known. Irrespective of the outcome, we are provided with a true assessment of our competence.

In the end we either conduct ourselves responsibly or we do not, we verify our level of preparedness or simply tell ourselves that we are competent. One thing we can never do is to blame the system if the failure lies in our failure to prepare. Through adequate preparation, we remove the propensity for key personnel to simply act as a result of their emotions and limited knowledge of the event. A well-trained team will make informed judgments based on known facts and react in a positive manner.

ALERT DISASTER CONTROL is a global provider of Emergency Response Services and Integrated Risk Management Solutions. ALERT offers fully integrated Incident Management Systems encompassing Emergency Response and Contingency Plans, interactive emergency preparedness exercises, associated training, audits and competence assessments for every facet of the business community."

For more information,
please contact:

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- Risk Assessments
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- Onsite HSE Representatives
- Toxic Environment Protection
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ALERT maintain an Integrated QHSE Management System to ISO 9001:2000, ISO 14001 and OHSAS 18001 standards as Certified by Det Norske Veritas

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Disaster Prevention and Daily Life

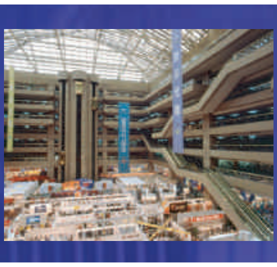
Displays of emergency response measures、operational procedures and achievements of Government Agencies、Enterprises and Civic Organizations in the field disaster prevention and response.

Fire Prevention and Safety Equipment

◎Fire prevention and fire safety equipment
◎Emergency rescue equipment
◎Electronic communications equipment
◎Fire prevention and emergency rescue vehicles, aerospace equipment, etc.

23rd International Fire Chiefs' Association of Asia General Conference, 2004

November 17~19, 2004 · Taipei International Convention Center



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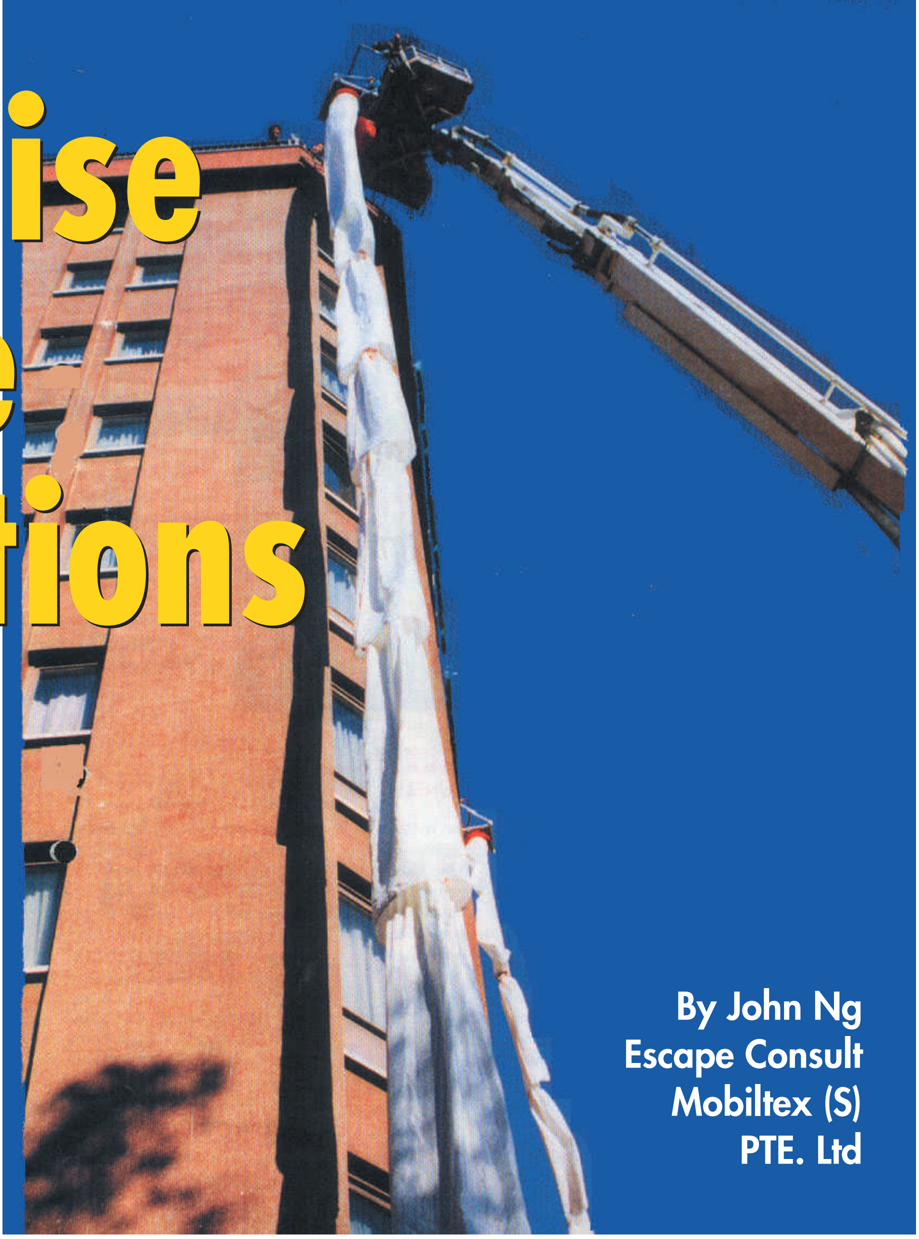
High Rise Rescue Operations

By John Ng
Escape Consult Mobiltex (S) PTE. Ltd



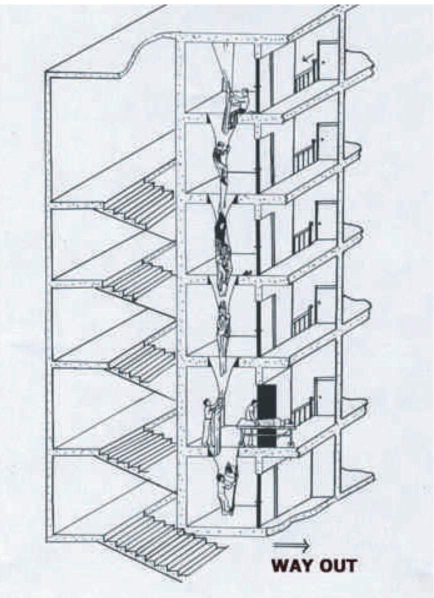
Picture courtesy of Escape Consult Mobiltex (S) PTE. Ltd

NO FIRE AND EMERGENCY Services Department likes to contemplate the possibility of a high-rise fire. While most building management have a procedure for evacuation which is not dependent on the fire brigade, however, if the system fails then the fire brigade will have to come to the rescue. When incidents involving high-rise rescue operations, it can become a dangerous affair of protecting and saving the property and lives. For this reason the provision of means of dealing with such incidents must assume at all times the possibility of, and need for, height rescue and extinguishing a fire at any time during rescue operations.

HEIGHT RESCUE EQUIPMENT

Traditionally, the rescuers from the Fire and Emergency Services Department are highly trained men to accomplish difficult and complicated height rescue operations in rope access techniques for high angle rescue. However, high angle rescue techniques and super-high aerial ladders employed yesterday can soon become obsolete or irrelevant in today's built-up environment as high rises progressively penetrating further into the skyline.

Today's firefighter is faced with not only a bewildering array of difficult and complicated high rise rescue operations but also choosing the most efficient height rescue equipment for firefighter safety. The most important factors are the efficiency of the equipment and the speed with which personnel and equipment designated for rescue purposes can be efficiently put into use.



Picture courtesy of Escape Consult Mobiltex (S) PTE. Ltd

TECHNOLOGY AND INNOVATION

The industry in fire and rescue equipment has a fine tradition of being innovative and creative. The mobile/portable rescue chute mounted on the bucket of hydraulic platform or aerial ladder of fire truck is an excellent example of the industry's innovative and creative outlook – of how to think and do beyond the conventional. It is one of the most vital pieces of height rescue equipment in the market that provides dual functions in one unit portable rescue chute. This equipment allow the rescue personnel to quickly deploy and put to use under adverse conditions when space, speed and mobility are essential for mass rapid height rescue operations:

- The quick deployment of mobile rescue unit and its flexibility of extending or shortening the chute length to the desired height for the

Picture courtesy of Escape Consult Mobiltex (S) PTE. Ltd

rescue allow the rescuers the speed to quickly provide victims a safer means of rapid vertical escape from bucket to ground. It eliminates the time involved in lowering and raising the aerial platform, and reduces the speed of mass rescuing victims from tall building by almost ten times in comparison to using the conventional method. Thus improves the evacuation capacity of any aerial ladder/ hydraulic platform of fire engine from 10 to 100 times. In addition, it is able to evacuate over 100 people in 10 minutes, including the handicapped.

- Should the surrounding of the building site could not accommodate the fire aerial truck, the portability and versatility of the rescue chute allows the rescue personnel to carry the rescue unit to the desired floor. The universal platform has a pair of bolts that serve as hangars that can hang on the handrail of the balcony within minutes for ready use. In situation where there is no handrail on the balcony, with the additional equipment (horizontal arms and vertical legs), it allows the rescue chute to be positioned at the parapet of balcony and window for quick rescue use.
- The chute main body material is constructed of three layers chute. This 3-way protection protects the evacuees once inside the chute from flame, heat, and smoke during rescue operation. The system works on the principle of gravity, using the stress and friction on the body as it slides down. Usability for all people, regardless of body size, shape and weight, injured on stretcher and unconscious people can use the chute to arrive at ground level quickly and relatively safely.

Picture courtesy of Escape Consult Mobiltex (S) PTE. Ltd

HIGH RISE EVACUATION

The super-high aerial ladders are not the sure way out of a burning high rise as they have their limits – they can extend to 52 metre, or 18 storeys. When incidents involving high-rise rescue operations beyond the reach of the height rescue equipment, it can offer a wide range of new and deadly problems for firefighters and the evacuees. Hence, the safest thing for building occupants to do in a high-rise fire is to head for the nearest staircase on the floor to avoid being trapped and make their way out of a blazing high rise.

Mass evacuation in a high-rise scenario offers a wide range of problems for the building management. It is important to realize that in the context of high-rise evacuation, there are people among the building population who may have difficulty or no ability to walk down stairs unassisted during emergency evacuation. The scenario may becomes even more complicated for the fire fighters when some of the occupants are trapped above the fire floors and that the stairwells are impassable because of smoke, heat or flames.

Just as we accept the daily use of elevators to gain access to every floor in high-rise buildings, so too there are ways that must be taken to ensure that all building occupants can also get down and out in the absence of elevators during emergency evacuation. Future tall buildings would need to provide another means of safer egress to facilitate speedier evacuation that allows all people, include those who have difficulty or no ability of using stairs to get out of building in extreme emergencies. Such an emergency exit system for everyone would simultaneously grants occupants their right to evacuate, maximize the escape potential of the elderly and people with disabilities while giving priority the firefighters to focus on fire suppression.

CONCLUSION

Fortunately, rare occurrence of major hazards in high rise buildings means that more often than not, the real-life experience of high rise rescue, mass evacuation and evacuating people with disabilities under urgent circumstances is not tasted. But when they do occur, a safe strategy would be to get as many people evacuated out of a blazing high rise in a predetermined evacuation plan than having to depend on firefighters to perform height rescue operations. This approach is the only acceptable way in guaranteeing life safety prevention.

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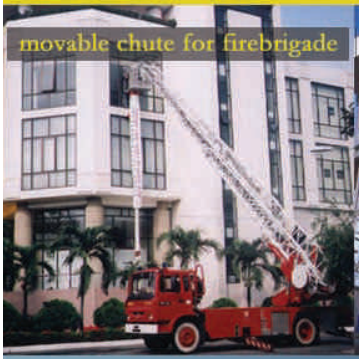
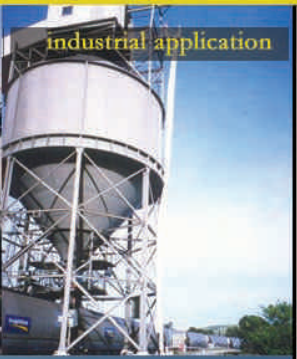
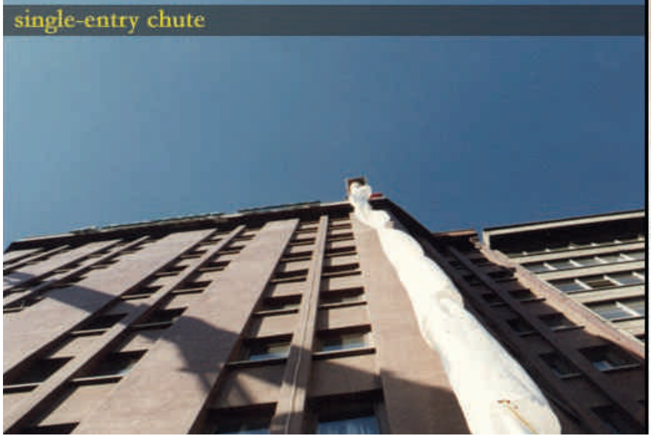


movable chute for firebrigade



industrial application

multi-entry chute



single-entry chute

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CHINA FIRE 2004

China's 10th Fire Equipment Technology Conference & Exhibition is going to be carried out ceremoniously in the theme of "**Innovation, Cooperation & Development**", hosted by China Fire Protection Association in October 19–22, 2004 in Beijing, P. R. China. Being a superior event of the field, China Fire aims to provide a golden platform for peers from all over the world to expose their products, exchange their views and make cooperation, especially on aspects of product information, technical innovation and industrial development.

Since 1986, CFPA has organized **CHINA FIRE** every other year in Beijing, China, and 9 in total successfully. **CHINA FIRE** enjoys a worldwide reputation, meanwhile, extends its influence on the fire protection industry internationally. The latest **CHINA FIRE** was held in 2002, with an exhibition area up to 25,000 square meters, and over 300 exhibitors (fire protection product manufacturers and academic institutes) from 15 countries and regions, bringing along with their high-tech products and technology, including 24 categories and thousands of types and models. Over 70,000 visitors from 30 countries and regions were attracted to the event to discuss their business. Top officials from the State Council were invited to cut the ribbon at the opening ceremony. Heads of overseas civil fire protection organizations and embassy officials from foreign countries also attended. Officials from relevant authorities in charge of fire safety, finance, public security, insurance, planning, construction etc., over the nation were invited to the event and made government procurement. During the event, we also carried out series of technical and academic seminars with great success.

As China accelerates its pace in economic reform, the nation is undergoing speedy development in economy and city construction, and the Government has been making more and more investments on improving fire protection facilities and equipments for our cities. Beijing has been honored to host Olympic Game in year 2008 and the scale of infrastructure construction of this great event is estimated to be up to US$ 45 billion. Shanghai will be the host of World EXPO 2010. The new wave of construction is calling for a considerable amount of high-tech fire protection products and creates a potential market for fire safety industry. Hence it is a perfect time for overseas fire protection enterprises and manufacturers to join this promising and enormous market.

CHINA FIRE 2004, a great event full of opportunities and hopes. We here ensure you our sincerity in cooperating with fire protection manufacturers and experts from both home and overseas and making every effort to contribute to the development of the industry.

Sun Lun
President,
China Fire Protection Association

ABOUT CHINA FIRE PROTECTION ASSOCIATION

CHARACTER

- CFPA is a legally registered national social organization, an academic and non-profit society formed by those who are engaged in fire technology, fire science, fire research and education, as well as fire protection enterprises.
- CFPA is an organization member of China Association of Science and Technology.
- The members of CFPA are composed of personal members, group members and foreign members. There are more than 30,000 personal members coming from all the places of the country, and over 2,300 group members.

MISSION

- To extend fire academic exchange and promote the development of fire science and fire engineering.
- To undertake or participate the evaluation and attestation on fire science and technology project, and the drafting and amendment of fire codes and standards.
- To organize conferences, seminars, exhibitions and technical training relating to fire science and technology, and promote the advanced fire technology and products locally and overseas.
- To facilitate the cooperation and exchange of information relating to fire science and technology internationally, and develop the friendly relationship with foreign fire protection association, organization and individuals.

EXECUTIVE OFFICES & COMMITTEES

CFPA is established as 4 offices, 3 executive committees, 7 professional committees, 4 fire protection subguilds, and a special committee composed of local well-recognized experts as well.

CFPA publishes three journals, and host one website **www.china-fire.com.**

CFPA develops international communions and activities together with foreign organizations as follows:

- National Fire Protection Association, USA
- Japan Firemen's Association
- Association for the Promotion of the German Fire Safety -vfdb-
- Fire Protection Association of Australia
- France Association of France-China Fire Friendship
- Korea Fire Safety Association
- Association of Philippine Volunteer Fire Brigades, Inc.
- Australian Building Codes Board
- Federation of World Volunteer Firefighters Associations
- Confederation of Fire Protection Association – International
- International Association for Fire Safety Science
- Federation Nationale des Sapeurs-Pompiers de France

g – China Fire 2004

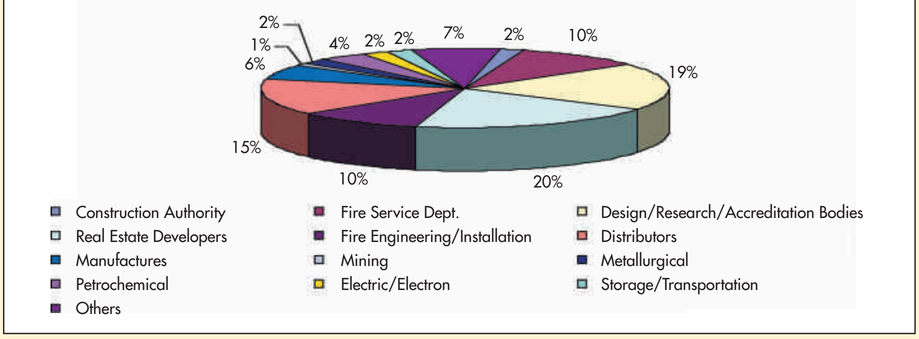
ADVANTAGES

- **CHINA FIRE** is the most impressive and superior fire protection exhibition in China on an international level, with the largest numbers of exhibitors and visitors from domestic and overseas.
- **CHINA FIRE** is the perfect combination of new products display, technical seminar and business cooperation. It is an international platform for fire enterprises to carry out technology innovation, technical and academic exchange and business discussion.
- **CHINA FIRE** attracted over 70,000 visitors in year 2002, who came from industries/institutes/relevant authorities relating to fire safety technology, products and equipment all over the country.

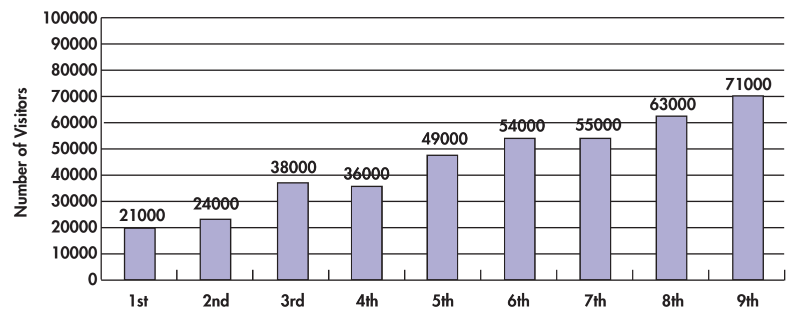
EXHIBITOR SHOWCASE OF PRODUCTS & TECHNOLOGIES

- Communication & Lighting Equipment for Firefighting
- Emergency & Rescue Tools and Equipment
- Extinguishers
- Fire Engines, Fire Boat, Fire Tank, Fire Planes, Fire Robots
- Fire Detectors & Fire Alarm
- Fire Pumps & Valves
- Fire Hydrant, Fire Gun & Monitor
- Fire Doors & Curtains
- Fire-stops, Fire Coating & Spray
- Fire Resistant Elements & Accessories
- Fire Apparatus for Petrochemical, Forest & Aviation
- Fire Engineering Design & Installation
- High Effective Extinguishing Agent & Equipment
- Hose & Nozzle Equipment
- Protective Clothing & Breathing Apparatus
- Smoke Control Systems & Poison-proofing Equipment
- Sprinkler Systems

Statistic of Visitors Composition of China Fire 2002



Statistic of Visitors of Previous China Fire



Based on the success and experiences achieved from the previous 9 shows, China Fire Protection Association would like to offer our professional service as always, providing the best platform to fire protection enterprises for spreading your information, to discuss your business and exchange professional views with each other, as well as a vast arena to expose advanced fire technology and fire protection products.

- **CHINA FIRE** is not only supported by Fire Department of Ministry of Public Security, the supreme authority for fire protection in China, but also by international well-know associations i.e. NFPA, Association for the Promotion of the German Fire Safety -vfdb-, Japan Firemen's Association, Korea Fire Safety Association, France Association of France-China Fire Friendship etc.

TOPICS FOR TECHNICAL SEMINAR

1. Fire Technology for High-rise & Large Space Buildings
2. Fire Technology for Petrochemical Industry
3. Technology & Application of Fire Detection, Alarm & Extinguishing Systems
4. Fire Technology for Energy Sources & Transportation
5. Firefighting Communication Technology
6. Fire Fighting Apparatus & Appliances
7. Research & Application of Fire Retardant Products & Materials
8. Fire Protection Product Standards & Testing Technology
9. Fire Protection Theory
10. Emergency Response & Fire Protection Measures

- **CHINA FIRE** has been carried out 9 times since 1986 with great success, keeping a long-term cooperative relationship with international fire protection enterprises and organizations.

OTHER SERVICES*

Designated transportation agency offering professional services for the exhibitors with transportation and Customs declare for the items on display.

Designated contractor offering qualified on-site installation and decoration.

*Please contact us for further information.

Information Center

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HOLMATRO’S CU 3035 CUTTER COMBINES HIGH PERFORMANCE WITH LOW WEIGHT

Although stronger cutters are available from Holmatro® their CU 3035 model is the favourite choice of many rescuers worldwide. The cutter owes its popularity to a combination of low weight and high cutting performances. Being available with two different types of blades, General Purpose (GP) or New Car Technology (NCT™), the CU 3035 cutters offer rescuers the choice between a high performance on a variety of applications (with GP blades) or a maximum cutting result on modern vehicle constructions (with NCT™ blades).

The CU 3035 cutter with GP blades has been developed for ‘general purpose’ use, i.e. in many different rescue situations. As it has a high cutting score on a variety of materials and profiles, this type is suitable for a wide range of applications which include not only road traffic accidents but also industrial accidents, accidents in an urban environment, train accidents etc.

The same cutter with NCT™ blades has been specially designed to deal with new car technologies: the application of harder materials and reinforced constructions in modern vehicles. New car technologies better protect the lives of vehicle occupants in case of an accident, but at the same time make it much more difficult to free those occupants once they get entrapped. A high theoretical cutting force does not automatically mean that a cutter is suitable to cut the latest car models. The CU 3035 NCT™ cutter (next to other cutters in Holmatro’s NCT™ series) has been equipped with blades which perform better on the harder materials and tougher constructions of modern vehicles. The special shape of these blades ensures that the material is drawn into

Holmatro CU 3035 cutter

the central (i.e. strongest) cutting area where maximum performances can be achieved. As this cutter type makes use of its force effectively, it has enough excess capacity left to be used on future, even stronger, car constructions.

Both GP and NCT™ types of the CU 3035 cutter have a low ready-for-use weight of 15.0 and 14.8 kg respectively. This makes them easy to carry to the extrication scene and easy to manage during the rescue operation. The combination of its low weight, its availability in a GP and NCT™ type to suit different application areas and its high performance in all of these areas makes it clear why Holmatro's CU 3035 cutter is such a popular choice among rescuers all over the world.

For further information, please contact:
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P.O. Box 33
4940 AA Raamsdonksveer
The Netherlands
Phone: +31 162 589 200
Fax: +31 162 522 482
E-mail: info@holmatro.com
Website: www.holmatro.com

HURST JAWS OF LIFE RESCUE SYSTEMS

HURST cutters provide maximum cutting force and total flexibility with a vast variety of models.The perfect blade for any application. Universal tools for most rescue jobs, tools specialised for traffic accidents, for steel walls and metal profiles.

Features:

- Range of blade shapes for all extrication needs
- Compact, lightweight design
- Wrap-around chrome-plated handle provides balance and ease of handling
- Safety engineered control valve location prevents inadvertent jamming during operation
- "Deadman"control valve

Challenge Cutter 200

This is a powerful curved blade cutter for a variety of different applications. The tool pulls back the metal in order to use the maximum cutting force. Perfect capability for all cutting needs in traffic accidents or rescue operations inside buildings.

Hurst Challenge Cutter 200

Challenge Cutter 301

This tool is especially designed for cutting jobs in traffic accidents involving buses and lorries. It features both a wide opening and an enormous cutting force. The shape of the blade was specifically engineered for the geometry of sheet metal parts and roof rails in modern vehicles.

Hurst Challenge Cutter 301

The Challenge Cutter 301 gives you the security of being well prepared for the cutting challenges of the vehicles of tomorrow.

Challenge Cutter 330

Providing the largest cutter opening, the Challenge Cutter 330 specialises in cutting metal sheets and metal profiles. Perfect for opening the metal walls of e.g. railway cars or buses.

Hurst Challenge Cutter 330

For further information, please contact:
Hurst Jaws of Life Rescue Systems
HALE PRODUCTS, INC.
A Unit of IDEX Corporation
711 N. Post Road
Shelby
NC 28150
USA
Phone: +1 704 487 6961
Fax: +1 704 487 7271
Email: rleonard@haleproducts.com
Website: www.jawsoflife.com

LUKAS® LS 501 EN

Cutting force more than 69 t

Cuts round steel up to 37 mm/1.5 in.

Lukas LS 501 EN

The LUKAS Premium Cutter LS 501 EN features the ultimate combination of monster force, the large blade opening and a lengthened cutting edge. The shape of the blades is optimized for vehicles parts.

The tool offers much more cutting performance than required for extrication of trapped casualties out of modern vehicles with highest stability design. By ergonomically designed blades the material is moved to the center of motion, where cutting forces are the highest.

Recommended applications:

- Tackling heaviest rescue operations such as modern cars, truck or bus constructions
- Cutting reinforced A- and B- wide C-posts of modern passenger vehicles and all-known side-impact bars
- Responding to large-scale rescue situations such as railroad, aircraft, naval accidents, natural disasters and building collapses.
- Cutting manholes in steel walls

Lukas LS 501 EN

Highlights:

- Offers the ultimate cutting performance
- optimum shape of the blades to cut vehicle parts
- The ergonomically designed blades pull the material towards the center of motion, where cutting forces are the highest
- Weighing only 19,2 kg at a cutting force of more than 69 t.

- Precise tool operation with your fingertips in any position
- Fast opening and closing action speeds up the rescue
- Operator safety design – all moving mechanical parts are covered
- Regrindable blades
- Tool fully balanced
- Well known LUKAS Quality and long service life
- Innovative technology by world's largest manufacturer of Hydraulic Rescue Equipment

Premium Cutter

Technical Data

Cutting force up to 152,900 lbs/680 kN

Round steel material up to dia. 1.4 in.–1.5 in./35–38 mm

Blade opening: 7.2 in./182 mm

Oil requirement: 9.2 cu. in./150 cm^3

Dimensions: 30.4 x 9.6 x 6.5 in/ 772 x 245 x 165 mm

Weight: 42.3 lbs/19,2 kg

For more information, please contact:
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A unit of IDEX Corporation
Weinstrasse 39
91058 Erlangen
Germany
Tel: +49 91 31 698 0
Fax: +49 91 31 698 394
E-mail: info@lukas.de
Website: www.lukas.de

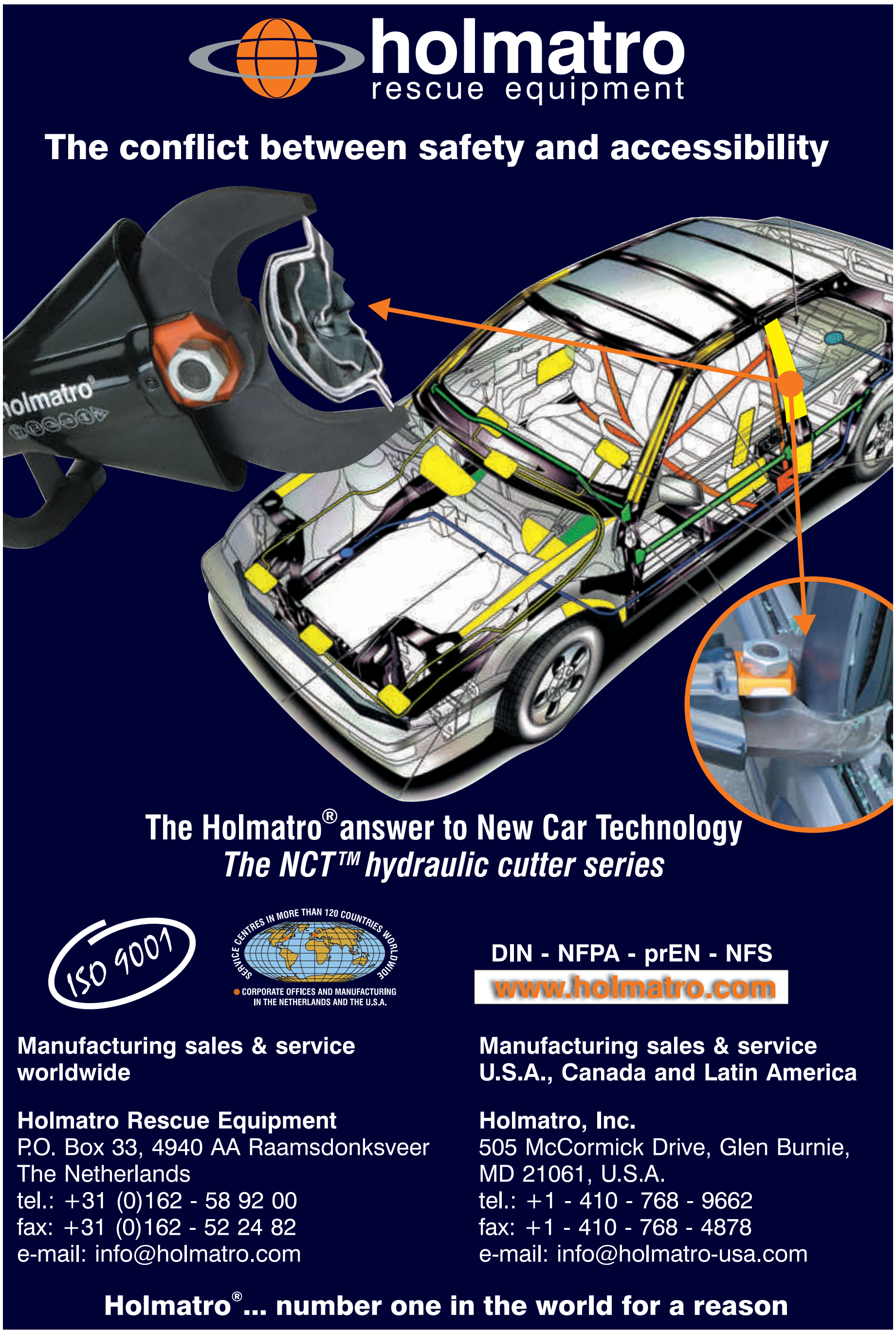
NEW HYDRAULIC CUTTING TOOLS FROM NIKE HYDRAULICS

Nike Hydraulics DHS150

NIKE HYDRAULICS has recently launched two hydraulic Cutting tools to the market, DHS150 and DHS240. The new tools meet the demands of a high cutting capability in high-tensile steel structure, that are used when manufacturing e.g. modern passenger cars and truck cabins etc.

The Cutting tools has been tested by the Swedish Rescue Service Agency Academy and proved to be able to "cope with the toughest task you can meet today". When testing the new hydraulic cutting tool DHS150 from NIKE HYDRAULICS one of the objects was the new SUV, Volvo XC90.

During the test the used cutting force was measured when cutting strategic points on the Volvo XC90. At no point more than 20-75% of the maximum cutting force was used. The toughest parts were middle and lower part of B-post and lower part of C-post.



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rescue equipment

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The NCT™ hydraulic cutter series

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The hydraulic body from Combi tool DHK45/370, which is a success story in it self, has been used for the two hydraulic Cutting tools, DHS150 and DHS240. This hydraulic body is well-tried as it was included in five hundred Hydraulic Rescue Kits, delivered to the Swedish Rescue Services Agency, some years ago.

Since the demands of the rescue service changes over time, NIKE HYDRAULICS has the unique possibility to modify the tool from an "ordinary" Cutting tool to a Combi tool or vice versa by just changing the blades.

The high cutting performance that has been achieved by DHS150 and DHS240 is due to the combination of an excellent hydraulic body and a developed cutting blade design.

In order to meet the demands from end users, DHS150 has a general cutting blade design as "a parrot beak shape". This means a high cutting force and an ability to force the material intended to be cut, into an area were the cutting force reach its maximum.

The hydraulic Cutting tool DHS240 meets the demands for an all-round tool and has a general cutting blade design as "an eagle beak shape" which in turn means a long reach, in the main straight blades and extreme high cutting force in the notch.

For more information, please contact:
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E-mail: info@nikehydraulics.se
Website: www.nikehydraulics.com

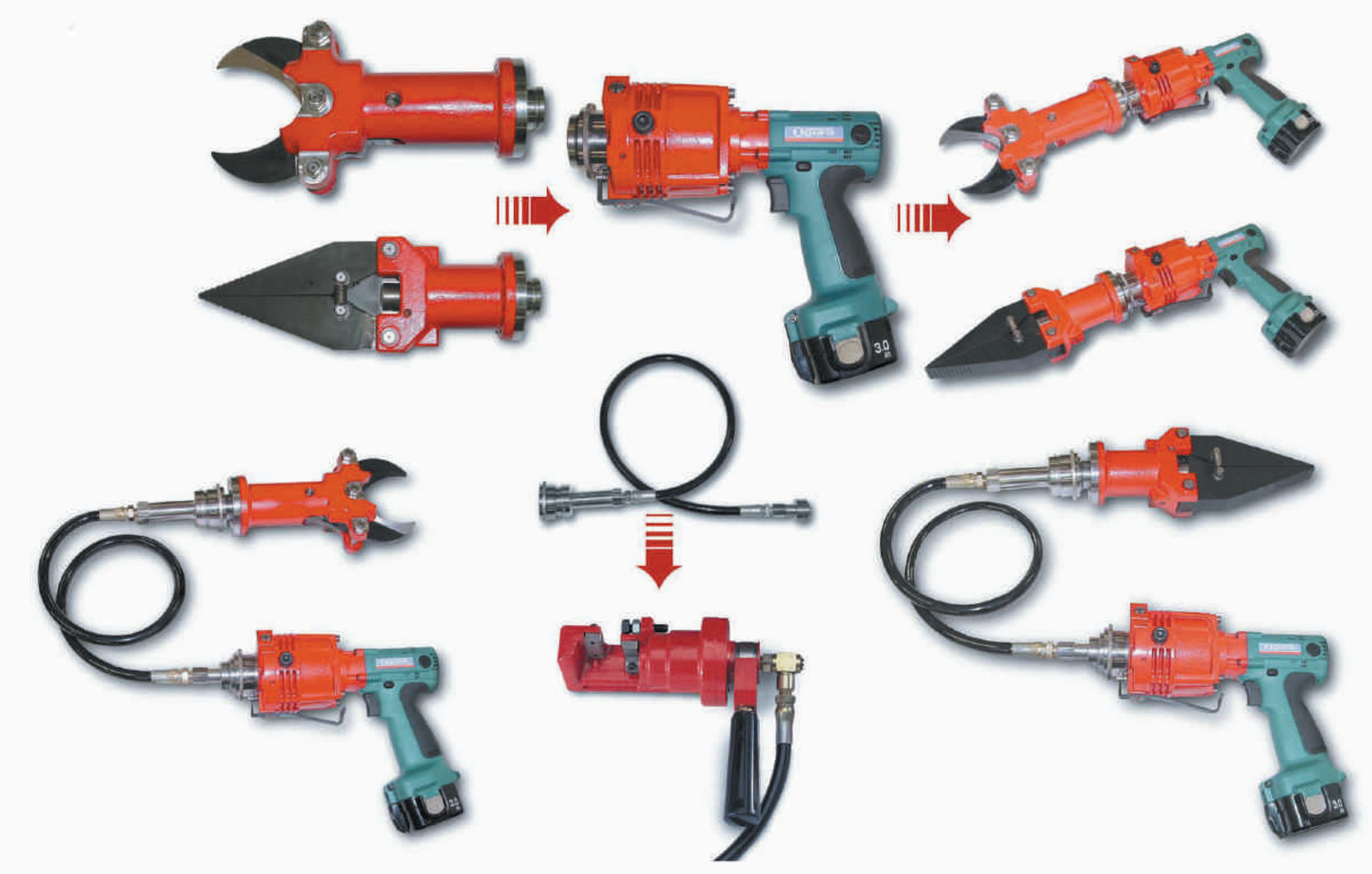
HRS-92 RESCUE SYSTEM

The Ogura HRS-92 battery-powered rescue system is designed to provide the Emergency and Security Services with a powerful, versatile, lightweight, and extremely portable set of tools for a variety of rescue situations. This unique system fills the gap left by more traditional heavy-duty tools that are not suitable for every situation because of weight, size, access difficulties, and other limitations,

The system is based around the electro-hydraulic Pump Unit and three Tool Heads (bar cutter, spreader, and metal cutter) that can be connected directly to the pump unit for normal operation or via a hose if greater flexibility in confined spaces is required. Another feature of the system is that it can be used under water when the optional waterproof sleeve is fitted to the Pump Unit. This design approach makes the system ideal for further expansion and in the near future there are plans to add a rabbit tool, jack, and ram. Where a customer has a special requirement Ogura is able to offer a "one off" tool design service.

The widely available Makita style battery that powers the system clips into the base of the pistol grip style handle where it is easily removed for charging or changing. Battery maintenance is made easier by the Ni-MH batteries that are memory resistant and the "intelligent battery charger" that prevents over charging.

Once on site there is no set-up time and the tools are ready for immediate deployment. In operation there are no trailing hoses (when tool head connected directly to the pump unit) or cables to limit freedom of movement.



Ogura HRS-92 rescue system

The HRS-92 Rescue system comes in two carrying cases complete with: Pump Unit; Metal Cutter Head; Spreader Head; Bar Cutter; Battery; Battery Charger; Extension Hose; Spanners. The total weight of the system is 30kg.

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Japan
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Fax: +81 46 238 4188
E-mail: oguraco@beige.ocn.ne.jp
Website: www.oguramulticutter.com

RESQ 210 CUTTER: UNIQUE BLADE CONFIGURATION

Zumro ResQ, the Netherlands, has invented another excellent piece of equipment for getting victims safely out of new car technology: the ResQ 210 Cutter with its unique blade configuration. The excellent maximum opening of 206 mm and overlap of the blades result in the best cutting experience. The unique combination of the shark teeth and the curved tips of the blades make it possible for this ResQ 210 cutter to grab the material firmly so that it cannot slip away during cutting actions.

This lightweight cutter has a maximum cutting force of 53.5 tonnes which makes it a heavy duty cutter. The ResQ 210 cutter can cut round bars of 35 mm and flat bars with a dimension of 100 x 15 mm.

Just like all Zumro hydraulic rescue equipment, this cutter also is according to prEN 13204.

In order to develop the best rescue solution, Zumro ResQ constantly listens to its customers. Due to this interaction Zumro stays ahead in the latest updates that are necessary to create the most reliable tools for the rescue services all over the world.

For further information, please contact:
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Tel: +31 252 419002
Fax: +31 252 411794
E-mail: info@zumro.nl
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Zumro ResQ 210 Cutter

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40150 Glenmarie, Shah Alam, Selangor, Malaysia.
Phone: +603-5569 5298 Fax: +603-5569 2895
Email: zumromal@streamyx.com
Website: www.zumroresq.com

As part of our continued expansion into global market and to deliver services tailored to our Asian Customers, Zumro ResQ has established a new Asia Manufacturing Plant and service facility in Malaysia.

The Asia Manufacturing plant with the land build up area of 19,000 sq feet (1,900 sq meter) is the first rescue equipment manufacturing facility in Asia. With the strategically located high tech facility and a well trained and educated team, Zumro Asia will provide a competent technical support and immediate response to our Asian customers.

The establishment of a permanent center in Asia with two other facilities located in Europe and USA will provide a global coverage and round the clock dedication to all Rescue Organizations.

Contact Person: Mr Chua Guan Cheng
(General Manager)

Intent and Fear
If the "intent" is to create "fear",
then it's terrorism no matter what...

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Sour Gas: The Deadly Oilfield Threat

By Robert Henderson,
BW Technologies

Stand-alone gas detection systems can be equipped with radio transmitters that allow real-time monitoring results to be wirelessly transmitted to a base station or control room located kilometers away from the remotely located detectors.

ON DECEMBER 23, 2003 a gas well blowout near the city of Chongqing in central China released a deadly mixture of natural gas and hydrogen sulfide. The toxic cloud of "sour gas" killed 243, caused the hospitalization and treatment of more than 9,000, and the evacuation of more than 60,000 nearby residents. Only two of those killed were gas field employees. The rest were residents of the surrounding area. Local emergency responders were completely unprepared for the accident.

The nighttime accident was China's worst oilfield disaster. The toxic cloud drifted across villages, killing people in their beds or in fields or roads as they tried to flee, leaving behind what authorities described as a 10-square mile "death-zone" downwind of the blowout.

A government report issued on January 2 concluded the drillers improperly dismantled anti-blowout equipment, misjudged the amount of gas in the well and failed to spot the blowout. The crew failed to immediately ignite the gas as it began to escape, which would have prevented the toxic cloud from spreading. Emergency workers couldn't approach the area until more than a day after the disaster because they lacked proper equipment to cope with the gas that continued to gush from the well. According to the Xinhua state news agency, the gas that continued to escape from the well was not deliberately ignited until 16-hours after the blowout, which was one of the reasons why the death toll from the accident surged from an initial eight victims to the final total of 243. Had local villagers been alerted through a system of sirens or public alarms, many more might have had time to successfully escape from the relatively slow moving cloud. When rescuers were finally able to enter the area, they found whole villages filled with bodies. Technicians finally plugged the leaking well on December 27, but the repercussions of the disaster will be felt for many years to come.

The oil company with responsibility for the site has already paid out over 33 million Yuan ($3.9 million USD) in compensation to the victims. According to Xinhua, compensation and insurance settlement costs may eventually exceed $48 million USD. The grief and suffering caused by the accident go beyond any efforts to quantify the damage.

Sour gas a deadly oilfield threat in developed nations also

The hazards of sour gas are by no means restricted to developing nations. In 1982, a sour gas well blew near the small town of Lodgepole in Southern Alberta, Canada and pumped sour gas into the air for 67 days. Two workers were killed and thousands of people downwind of the blowout were affected by the release. In Edmonton, over 75 miles away from the blowout, residents complained of nauseating odors, while closer to the well site, residents complained of a variety of increasingly serious symptoms, including headaches, eye irritation, nosebleeds (especially among children), as well as gastrointestinal and respiratory distress.

After a high-profile inquiry, Alberta officials concluded that the accident could probably have been avoided if the site operator had followed a policy of more cautious drilling in the critical zone, and if they had been "better prepared to deal with unexpected developments." It was fortunate that the blowout occurred in a remote location. Had the blowout occurred in a production area on the outskirts of Calgary, the largest city in the Province, the results could have been Catastrophic.

Today Alberta has some of the

Sour Gas: The Deadly Oilfield Threat

	8-Hour TWA	STEL	Acceptable Ceiling Concentration	Acceptable Maximum Peak Above Ceiling Concentration for an 8-Hour Shift	
				Concentration	Maximum Duration
Federal USA OSHA PEL	NA	NA	20 ppm	50 ppm	10-minutes once only if no other measurable exposure occurs during shift
NIOSH REL (used as exposure limit by many states)	10 ppm	15 ppm	NA		
ACGIH® TLV®	10 ppm	15 ppm	NA		

toughest H_2S health and safety regulations in the world. Provincial oil industry standards include a comprehensive system of monitoring and reporting procedures. In the case of "critical wells" that pose the greatest risks because of H_2S concentration and/or proximity to population centers, well operators must install redundant safety equipment, prepare detailed emergency-response plans, go door-to-door to warn residents of impending drilling and maintain minimum separation distances from homes and public buildings. Most importantly, in the event of a release, evacuation of the surrounding area becomes mandatory if the hydrogen sulfide concentration reaches 20 parts per million.

Toxic properties of H_2S

H_2S is produced by the action of anaerobic, sulfur fixing bacteria on materials that contain sulfur. It is a constituent of natural gas, petroleum, sulfur deposits, volcanic gases and sulfur springs. It is especially associated with oil production, refining activities, sewers, and many types of confined spaces. Tragically, hardly a week goes by that does not include a fatal accident somewhere in the world due to H_2S exposure.

At low concentrations, H_2S famously has an odor similar to rotten eggs. At higher concentrations, H_2S rapidly deadens the sense of smell. This rapid loss of the ability to smell H_2S leaves workers defenseless when they are dependent only on their human senses to take preventive measures or escape from affected areas.

At 750 ppm, inhalation can cause immediate collapse and unconsciousness. If exposure is very brief, for example, transitory envelopment by a passing gas cloud, the victim may awaken promptly and experience no adverse effects at all. In industries where hydrogen sulfide exposure is commonplace, for example oil field work, employees often refer to this phenomenon as "knockdown". A single breath at a concentration of 1,000 ppm results in immediate loss of consciousness, followed by cardiac arrest and death unless the unconscious individual is successfully revived. Many of the villagers killed in the China disaster died in their sleep, without even an opportunity to attempt to escape.

H_2S is soluble in water, explosive, (its LEL concentration is 4.3% volume), corrosive, heavier than air, and highly toxic. The China blowout occurred in a mountainous area crisscrossed by a number of downward sloping valleys. The valleys helped contain and funnel the heavier than air H_2S into nearby villages. The cloud persisted in localized areas until eventually neutralized by rain.

The corrosive properties of H_2S were especially apparent in newspaper photos of the victims of the China disaster. Many had eyes swollen shut, with faces horribly burned by exposure to the

Today's four-gas monitors for LEL/02/H_2S/CO measurement are rugged, affordable, and more compact than many single-sensor H_2S detectors sold in previous years.

Over 65% of confined space fatalities
are would-be rescuers.
Protect yourself from becoming a victim.

Toxic atmosphere in well kills three firefighte

Residents were mourning yesterday for three volunteer firefigthers who died while helping a neighbor to clean out a 15 meter well and were overcome by toxic gas.

The deaths were the first in the 25-year history of the 70-member volunteer company in Central Fulton County said assistnat fire cheif Robert Cover.

James F. Chestnut Jr., 20, and Richard Lorem ipsum dolor sit amet, consectetuer adipiscing elit

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corrosive vapors. Many more have suffered permanent damage to delicate lung tissues exposed to the gas. For many survivors there will never be a full recovery.

Exposure limits for H_2S vary widely as a function of jurisdiction and workplace activity. The most widely recognized standards for H_2S reference an 8-hour TWA of 10 ppm or 20 ppm, and a 15-minute STEL of no more than 15 ppm. Concentrations above 100 ppm should be regarded as immediately dangerous to life and health.

Using atmospheric monitors as part of an integrated plan to ensure worker AND community safety

The only way of being sure that hydrogen sulfide is not present in dangerous concentrations is to look for it with an atmospheric monitor designed for its detection.

● Zero maintenance personal H_2S detectors

Electrochemical H_2S sensors are not consumed or affected by exposure to gas. Because they require so little power during normal operation, it is possible to package the sensor, an LCD to display readings and messages, audible alarm buzzer, built-in vibrator, flashing LED alarm light, and battery capable of lasting a full two years, all into a gas detector so compact it can be clipped into a shirt pocket, or worn on a hard hat. Because the presence of H_2S is such a predictable hazard, at many oil production sites and refineries every worker is required to wear a personal gas detector for H_2S at all times while they are on site. Wearing an H_2S "Clip" or "Badge" at these facilities is as routine as wearing a hardhat and eye protection.

● Multi-sensor "four-gas" monitors

The potential presence of H_2S often goes hand-in-hand with the potential for combustible gas and vapor accumulations, as well as oxygen deficiency. Most leading manufacturers offer high quality, basic four-gas monitors priced between $695.00 to $995,00 USD. In many cases, the cost is only marginally more than the cost for a single-sensor H_2S detector. In addition, four-gas instrument designs have become so compact that they are actually smaller than the single-gas detectors marketed only a few years previously.

● Fixed gas detection systems

Fixed detection systems provide alarm notification on a 24-hour a day basis. Alarms are activated whenever conditions become unsafe, whether or not workers are currently present in the affected areas. In particular, fixed systems can be used to automatically notify local authorities in the event of an emergency. Even if workers in the area are incapacitated, or unable to communicate the existence of the alarm condition, a permanently installed system can sound the alarm to the proper authorities.

● Self-contained "Stand Alone" monitoring systems

Several manufacturers offer freestanding, solar-powered gas detection systems that can be permanently located in remote areas. "Stand Alone" systems can be equipped with radio transmitters that allow real-time monitoring results to be wirelessly transmitted to a base station or remote alarm located several kilometers away from the remotely located detectors. Because these systems can be powered by means of solar panels, they can easily be installed in areas that are too remote for traditional, line-powered gas detection systems. Because they can be mounted on portable tripods, it's easy to move the systems from one location to another as requirements change.

Gas detectors used to monitor for the presence of H_2S are increasingly compact, rugged, easy-to-use, and much less expensive than ever before. It may literally be less expensive to buy an entirely new instrument at today's prices, than to replace just the sensors in an older model. Given the prevalence, dangers and human costs associated with H_2S accidents, hydrogen sulfide detection should be an integral part of every oil industry worker safety program.

Robert Henderson is Vice President, Business Development for BW Technologies. Mr. Henderson has been a member of the American Industrial Hygiene Association since 1992. He is a current member of the AIHA Gas and Vapor Detection Systems Technical Committee. He is also a current member and past chair of the AIHA Confined Spaces Committee. He is also a past chair of the Instrument Products Group of the Industrial Safety Equipment Association.

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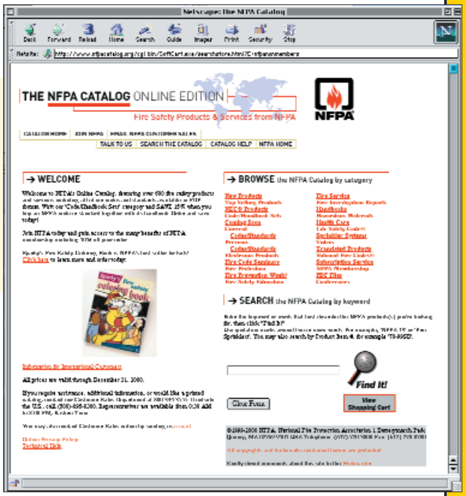
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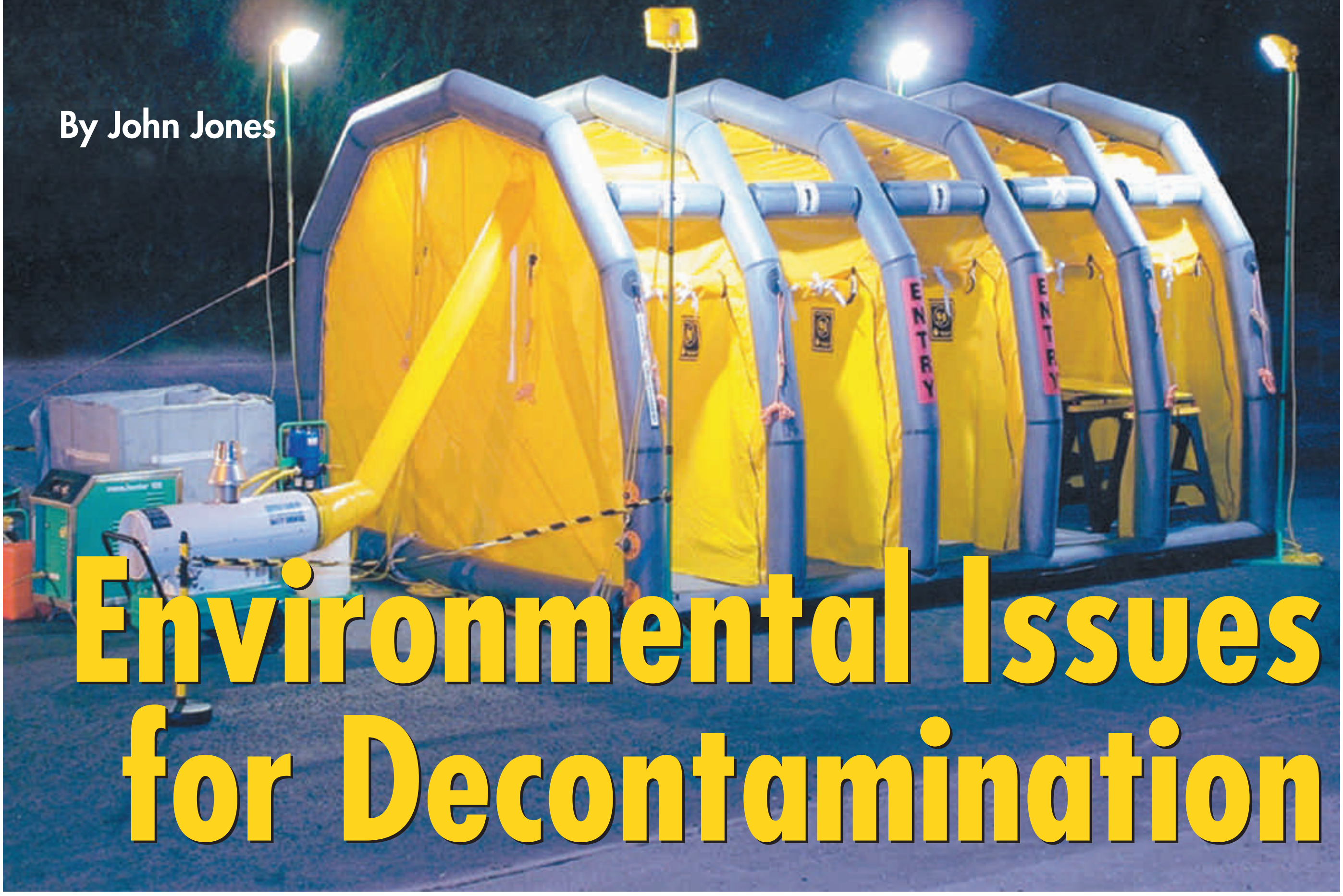
By John Jones

Environmental Issues for Decontamination



Hughes CUPOLAdecon 5 mass decontamination system with integral sump

THE NEED FOR EFFECTIVE DECONTAMINATION has grown immensely over the last few years. In part, this is due to the natural progress of industry, which inevitably introduces new hazards, but it is also driven by the heightened threat of indiscriminate terrorist action.

The latter cause has spurred on the development of mass decontamination systems capable of handling several hundred people an hour. As a result of the intense research, many of the techniques and hardware, initially developed for mass decontamination systems, are now used on other systems.

All decontamination systems, by their very nature, produce potentially hazardous waste, which must be collected, stored and disposed of safely. The fact that the majority of these systems are portable and may be deployed in widely differing and often less than perfect locations compounds the problem for equipment designers. They have to balance the practical necessity of a portable and easily deployed unit with the need to safely collect and contain wash-off and minimise the risk of environmental contamination.

It is no longer considered environmentally acceptable to discharge wash-off into the main drainage system, except when handling very low-level toxic waste whose concentration has first been reduced to a safe level. However, conscious of the potential threat from accumulated discharges, legislators are regularly redefining 'safe levels' and tightening up the regulations accordingly.

The safest solution is to collect all wash-off.

Decontamination shelters, designed for mass decontamination, have a built in sump to collect the wash-off. The floor of the unit consists of plastic floor panels laid in the sump. They are of sufficient depth to ensure that casualties are not standing in the collected wash-off even if the unit has to be assembled on a slight incline.

A similar integral sump is also fitted, which is primarily designed for decontaminating members of the emergency services and their equipment, although it can be used for members of the public. In this instance, the sump extends beyond the exit so that as emergency personnel remove their suits, any residual contamination can be collected safely.

The collected wash-off is then pumped to portable storage to await

> *It is no longer considered environmentally acceptable to discharge wash-off into the main drainage system, except when handling very low-level toxic waste whose concentration has first been reduced to a safe level.*

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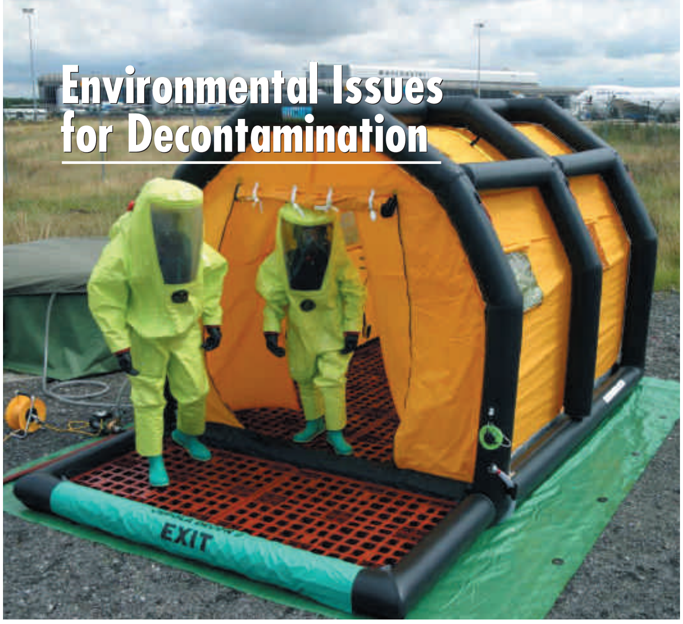

The extended sump of the Hughes CUPOLAdecon 2 contains residual wash off during removal of clothing

removal from the scene. Pumps, usually low pressure, high volume units, need to be of sufficient size to cope with the flow of water. There are basically two types; submersible, the simplest option, which goes inside the unit and the centrifugal pump, which is outside the unit affording easier access.

Palletised waste receptacles offer one of the most convenient solutions combining portability with a reasonable capacity. When full, they can be stacked up to two high and when empty they fold flat on their pallets for easy storage ready for rapid deployment. As well as collecting wash-off directly from decontamination showers, the waste receptacles can be used for safe storage of contaminated clothing and equipment. The units are made from heavy-duty woven polypropylene with integral side pockets into which MDF panels are fitted to form a rigid structure. The receptacle has a capacity of 1 cubic metre or will hold up to 1000 litres of contaminated water and can be moved easily using a forklift truck or can be lifted with slings.

Portable reservoirs offer an alternative, particularly where larger volumes are concerned.

Palletised waste receptacles combine portability with a 1000 litre capacity

Portable reservoirs offer a larger capacity storage option

They are typically available in sizes from 250 to 25,000 litres, and in addition to offering temporary storage for wash-off they can be used to contain hazardous chemicals from leaking tanks. They are equally suited for use as holding tanks for storing water at remote locations for wash down or fire-fighting. Reservoirs can be deployed by simply inflating an integral collar in the top to establish the basic shape, then connecting a hose. As hazardous chemicals or waste-water is pumped into the reservoir the rubber coated nylon walls unfold and the unit gradually expands to a uniform shape to accommodate its maximum capacity. An elasticated top fits around the collar, and is supported on a float, which keeps the top clear of the surface and prevents rainwater accumulating on the top.

However, these large reservoirs are not intended to be moved when full and the best option is to transfer the contents to a palletised waste receptacle, which can then be moved easily.

In view of the cost difference, portable reservoirs are considered re-usable items whereas palletised receptacles can be either re-usable or disposable depending on the circumstances and the nature of the contained chemicals.

Pillow tanks have been used for many years and are more suited to long-term storage. They remain a good option especially for situations where a gravity feed is used. However, as the choice of storage solutions increases, the disadvantages of the pillow tank tend to outweigh the benefits. One problem is that it is difficult to assess the level of liquid in the tank and the difficulty of handling means there is an increased risk of spillage. Gravity feed also means that a residue of contaminated liquid is always going to be present in the feed pipework after filling and this inevitably poses a further containment and disposal problem.

> The collection and storage of hazardous waste is inextricably linked to the development of decontamination systems. Equipment manufacturers recognise that to adequately meet the needs of a modern world they must offer a comprehensive solution that takes into consideration both security and environmental issues.

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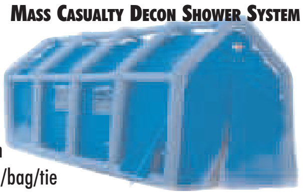
While FSI offers multiple sizes of shower systems, the DAT™ 3060S offers an integral ground floor that will hold up to 200 gallons of water before requiring pump out, 4 roll up windows, 2 skylights, full closure slip in/out dirty entry/clean exit doors, four 14" dia. HVAC/Clothes ducts, air inflation valve & hose, pressure relief valve, pegs/rods/bag/tie downs, repair kit, manual, carry bag, 2 upper air vents, and an extra full center divider curtain to allow for changing the Shower to a 2 line non-ambulatory unit. The DAT™ 3060S offers private dry undress/redress areas in a three line Decon Shower configuration 10' W x 20' L x 9' H (200 sq. ft.) that can handle combinations of up to 6 non-ambulatory, 2 ambulatory, 4 non-ambulatory and 1 ambulatory at any one time in the middle 10' x 10' area.

DAT™ 3060S THREE LINE MASS CASUALTY DECON SHOWER SYSTEM



The DAT™ 4070S offers an integral ground floor that will hold up to 300 gallons of water before requiring pump out, 4 roll up windows, 2 skylights, full closure slip in/out dirty entry/clean exit doors, four 14" dia. HVAC/Clothes ducts, air inflation valve and hose, pressure relief valve, pegs/rods/bag/tie downs, repair kit, manual, carry bag and 2 upper air vents. The unit can handle 4 non-ambulatory stretcher personnel, or up to 8 ambulatory victims at any one time or any combination of the above in the middle 13' W x 10' L shower area. It offers private dry undress/redress areas in a 300 sq. ft. unit.

DAT™ 4070S FOUR LINE MASS CASUALTY DECON SHOWER SYSTEM

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A Division of Fire Safety International, Inc.™
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Berea, OH USA 44017

Phone: 440/891-1523
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Web: www.fsinorth.com

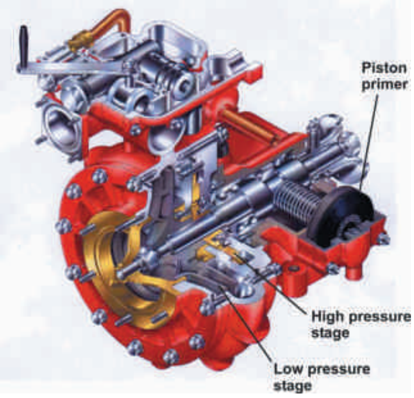
HALE PRODUCTS EUROPE – VEHICLE PUMP INNOVATION

HALE PRODUCTS EUROPE is one of the world's leading providers of specialist fire fighting equipment. With extensive manufacturing facilities in the United States and Europe, and distributors throughout the world, HALE produces truck mounted, trailer mounted and portable fire pumps. HALE is the home of the internationally recognised GODIVA brand of fire pumps, which are to be found in service in more than 100 countries. Hale are particularly noted for innovations in vehicle mounted pumps. Ever since the introduction of the first multi-pressure pump, the UMP in the mid 1960s, the Godiva Fire Pump has been the first choice for virtually all UK brigades and many overseas.

Multi-pressure Pumps

The Godiva **World Series** vehicle pump is proving a popular replacement for the previous GM and UMP/UMPX Ranges – leading pump designs that have given many years of service to firefighters throughout the world.

The major design feature of all Godiva multi-pressure pumps is the configuration of 2 impellers on one drive shaft. This arrangement permits a simple and compact design, eliminating the need for the additional space associated with other multi-stage pumps. The low pressure is provided by a centrifugal impeller at the front of the pump and the high pressure stage is located in a separate section behind. The high pressure stage uses a regenerative or peripheral design to inject considerable energy in the water stream.



Cutaway view of World Series Pump, showing low and high pressure stages on one shaft and reciprocating piston primer at rear

World Series pump – stainless steel model

Other design features include a ball valve to activate/deactivate the high pressure, automatic pump priming with either a water ring primer or a piston primer and a self-adjusting mechanical seal on the pump shaft to separate the wet and dry parts of the pump. All these well-proven features of the Godiva muliti-pressure pump are integral to the design of the latest pump, the World Series range.

Key innovative features of the World Series include:

- Completely new design introduces improved efficiencies with robust construction
- Full compliance with anticipated new CEN standards
- Optional control panel – incorporating ***Class 1*** instrumentation
- Self-cleaning filtration system
- Low pressure water available to side hose-reels as a standard feature
- More compact design envelope and reduced weight
- Conforms to DIN and International standards as required
- Light alloy and gunmetal versions
- Significantly reduced scheduled maintenance requirements

The very latest innovation for the World Series pump is the all stainless steel version, which was recently introduced to the US market at the Fire Rescue International Show 2003, Dallas. Stainless steel provides the pump with life long corrosion resistance and a guarantee of low maintenance costs.

Compressed Air Foam Systems

The superior firefighting power of Compressed Air Foam systems is increasingly recognised. Hale has been a leading developer of CAFS technology for many years, and can now supply a range of integrated engineering solutions designed to complement the equipment inventory of any service. The range provides a variety of installation options from OEM to retrofit and stand-alone, self-contained systems.

Fighting fires with CAFS means enhanced knockdown times, less water usage, less environmental and water damage and a more efficient use of manpower.

World Series Pump with Integrated CAFS

In this configuration the CAFS unit is a compact package attached to the rear of the World Series pump "piggy-back" style, it comprises of a compressor, Hale FoamMaster V series foam induction unit and Hale X-Mixer system. A solid-state electronic control provides a safety system and full operator control is provided at the pump control panel.

World Series pump with Integrated CAFS

For more information,
please contact:
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A Kidde Company

Flexible Solutions to Emergency Water Supplies

By Mike Willson

Angus Fire Fetch deploys and retrieves Hi-Vol in record time

Picture courtesy of Angus Fire

THE ABILITY TO deliver large, independent supplies of water to meet firefighters requirements for additional water supplies in Municipal Fire and Rescue environments and compliance with the International Civil Aviation Organization (ICAO) requirements for aircraft firefighting has recently become a major issue. This is being driven by the need to maintain a safe and sustainable environment in large emergencies where large flows and pressure are required often for far longer than the ***minimum*** specified periods.

RELAY PUMPING OUTDATED

Traditional solutions have centred around using existing hydrant ring main systems, bulk water storage tanks and relay pumping. Unfortunately these all have fundamental limitations. Hydrant ring mains are often old, poorly maintained and can be ruptured in an explosion. Bulk water storage tankers offer limited volumes of water and require good road access. Relay pumping can take up valuable resources in terms of manpower and vehicles and is only as reliable as its weakest link. In addition, relay pumping often generates the safety hazard ***spaghetti effect*** due to the many hoses needed to supply large volumes of water at sufficient pressure. This is because the pressure loss down a fire hose increases rapidly when the flow is taken above the normal acceptable limits for a standard diameter. For example, flowing 800 litres/minute down a 64mm hose will produce a pressure drop of 5.6 bar over 200 metres *(source: Angus Fire HoseCalc software).* Imagine trying to move 20,000 litres/minute of water, 1000 metres down 64mm hoses – a logistical nightmare! "Spaghetti effects" can be a thing of the past with modern LDH (Large Diameter Hose), sometimes called Hi-Volume systems or Hi-Vol for short.

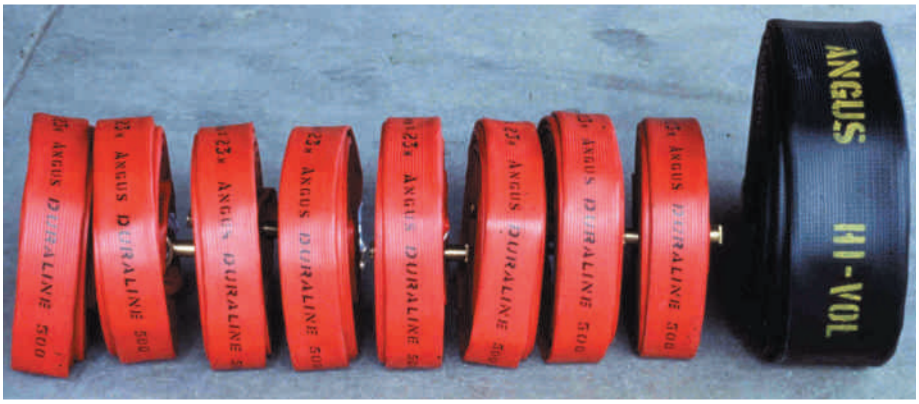
LDH PROVIDES THE ANSWER

The good news is that by increasing the hose diameter, the pressure loss can be greatly reduced. A 1% increase in hose diameter results in a massive 5% drop in pressure loss. In practical terms, this means for example, a 125mm diameter LDH hose can move the same amount of water, the same distance, with the same pressure loss as eight parallel 64mm lines!

In order to exploit the pressure improvement benefits of increasing the hose diameter, Angus Fire offers a range of LDH 4″,5″ and 6″ (100-150mm) dia. hoses, as well as eXtra Large Diameter Hoses (XLDH) in 8″ to 12″ (200-305mm) diameters. These products solve the pressure loss problems at a stroke, but do present some handling difficulties.

NYLON CONSTRUCTION NEEDED

LDH hose is no different to other layflat hoses, they are available in a range of qualities from several



The amount of water moved by eight lengths of 2.5-inch hose can now be moved by a single length of 5-inch Hi-Vol

Picture courtesy of Angus Fire

Firekat is the new way to deploy and retrieve Hi-Vol over rough terrain

Picture courtesy of Angus Fire

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manufacturers. However the large the diameter the more critical the hose construction becomes as there are larger volumes, weights of water and pressures per square inch on the fabric of the hose. Polyester yarns are sometimes used, but these are more likely to result in kinking, as they do not stretch under pressure. They are also unable to maximise the pressure savings down long lengths of LDH as they cannot swell. Swell is a special characteristic only found in Duraline type hoses with an all nylon jacket. Nylon has special characteristics that it can be stretched slightly in use without breaking. This allows the best LDH hoses to minimise kinking, even at low operating pressures and also achieve swell, which allows the hose to stretch slightly and pass more water with lower pressure losses than polyester yarn hoses. Hi-Vol LDH hoses are made from specially formulated rubber blends designed to resist ozone attack, abrasion and oils/acids weakening the hose. This special rubber is extruded through the nylon textile jacket to make a very durable long lasting LDH.

MANUAL HANDLING SUPERSEDED

In many cases LDH has been handled manually, but with current manual handling regulations in Europe long lengths can put firefighters at risk of injury due to the weight involved. Consequently the heavy nature of these products have often discouraged firefighters from taking full advantage of this technology. This is no longer the case because new cost-effective deployment and retrieval solutions have arrived that take the physical effort out of using LDH, with a resulting dramatic increase in its popularity and usage. Leading Municipal and Aviation Fire Services now use LDH as a regular tool in their armoury, knowing that it can be deployed quickly at an incident and simply retrieved using Fast Efficient Techniques for Collecting Hi-vol (FETCH) hose systems. There are various units available, some bristling with electronic gadgetry. Firefighters can now easily lay out a temporary ring main of LDH to reach less accessible areas and feed operational personnel with reliable water flow and pressure requirements.

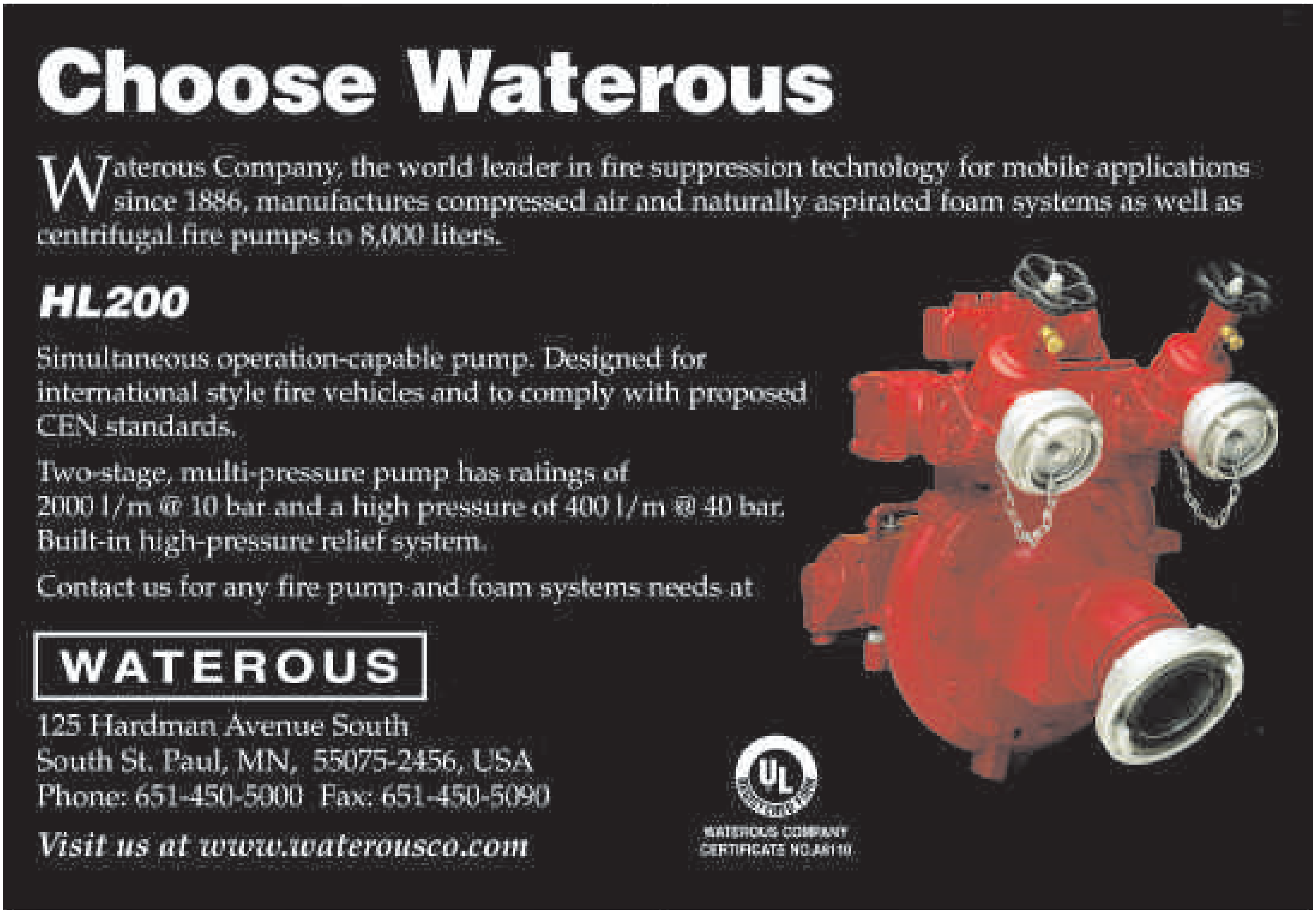
To store, deploy and retrieve over one kilometre of 150mm hose sounds like a major system design exercise, but with these reliable modern deployment and retrieval systems it is quick and easy to complete the task. There are now sufficient sites around the world protected with LDH that the ground breaking engineering work needed to produce a total solution to overcome the difficulties has been achieved and FETCH is largely responsible for this significant advance. The LDH is normally stored in a truck or de-mountable pod system, where it is flaked for rapid deployment when an incident occurs. Once the incident is declared over, retrieval of the hose can be quickly handled by the modular FETCH unit built into a vehicle (to meet customer requirements) requiring only 3 operators to complete the task. For the first time swift deployment and rapid retrieval are achieved with the minimum of effort. Off road versions are also available.

HIGH QUALITY LDH ESSENTIAL

These water management solutions are designed for emergencies, which it is hoped will never happen. This means the hose is likely to spend the majority of its life stored, probably in a flaked state. This unfortunately puts the hose under a great deal of stress, particularly along the fold. Therefore, in exactly the same way as it is critical to choose a well designed and manufactured fire hose for first-attack fire fighting, LDH and XLDH products must be chosen with care. For LDH hose BS6391 Type 3 is the international standard to choose for your assessment criteria. Buying the cheapest hose on the market can mean that three years down the track, when maybe it is first used in an emergency, it could let you down badly and potentially put firefighters' lives at risk. By seeking out a manufacturer with a proven track-record of supplying LDH that exceeds the requirements of BS6391 type 3, has technical expertise in XLDH products, and makes its own retrieval and deployment systems you are far more likely to achieve a reliable long term solution to you water supply problems. This way you can have confidence that the system has been designed to ensure the hose is stored in the best possible conditions.

CONCLUSIONS

Today's firefighters need optimum flexibility. They can be called upon to assist in many kinds of emergency, including flood control and disaster relief eg. Earthquake situations where all the established water ring main systems are broken and disrupted. Even under such demanding conditions firefighters have a responsibility to be able not only to maintain an adequate water supply whatever the circumstances, but also to deliver ever increasing quantities of water to deal with the more complex hazards we see in the modern world. The flexibility and efficiency that modern LDH solutions now offer means that there is flexible mobile solution available to help firefighters achieve these tough objectives, and help them maintain and optimise supplies of water in the widest range of emergency scenarios.



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MASTER STREAM NOZZL

AKRON BRASS COMPANY

Model Number	1745 & 1755	5077 & 5078	5060	1577	4460 & 4461
Product Name	TurboMaster	Akromatic	Akromatic	SaberMaster	Rampage
Origin	Akron Brass	Akron Brass	Akron Brass	Akron Brass	Akron Brass
Type of Nozzle	Adjustable Flow	Automatic	Automatic	Combination Smooth Bore & Spray	Fixed Flow
Sizes Available	2 1/2"	2 1/2" & 3 1/2"	2 1/2" & 3 1/2"	2 1/2" & 3 1/2"	2 1/2"
Configurations	Manual Operation	Electric Operation 12V & 24V	Manual Operation	Electric Operation 12V & 24V	Manual Operation
Material Used for Nozzle	Pyrolite	Pyrolite	Pyrolite	Pyrolite	Brass
Weight	5 kg & 5.9 kg	6 kg & 9 kg	5 kg	10.9 kg	10.5 kg
Quoted Output Range (lpm)	950-2900 lpm & 1900-4800 lpm	950-4800 lpm/ 1900-7600 lpm/ 1900-5700 lpm	950-4800 lpm & 950-3800 lpm	50.8 mm smooth bore & 4800 lpm spray	1900, 2900 & 3800 lpm
Delivery Times	2-6 weeks	2-6 weeks	2-6 weeks	2-6 weeks	2-6 weeks
Unique Features	1. Four adjustable flow settings 2. Spinning fog teeth 3. Spray pattern detents	1. 5.5 bar operating pressure 2. Spinning fog teeth	1. 5.5 bar operating pressure 2. Waterproof potted motors 3. Spray pattern detents	1. Smooth bore and spray capability in one nozzle 2. Built-in stream shaper	1. Corrosion resistant brass 2. Built-in stream shaper 3. Grease fitting 4. Style 4460 has twist off capability.
Warranty	5 Years	5 Years	5 Years	5 Years	5 Years

Akron Brass Company
343 Venture Blvd.
Wooster, OH 44691, USA
Tel: +1 330 264 5678
Fax: +1 330 264 2944
Website: www.akronbrass.com

ELKHART BRASS

Model Number	SM-1000	SM-1000H	SM-1250	CJ-B	HF-350 or HF-500
Product Name	Select-O-Matic	Select-O-Matic	Select-O-Matic	Select-O-Stream	Hydro-Foam
Origin	USA	USA	USA	USA	USA
Type of Nozzle	Automatic	Automatic	Automatic	Constant Gallonage	Self-educting – Manual
Sizes Available	2.5" or 3.5" swivel inlet	2.5" or 3.5" swivel inlet	2.5" or 3.5" swivel inlet	2.5" swivel inlet	2.5" swivel inlet
Configurations	Manual Operation	Hydraulic Operation	Manual Operation	350 or 500 (Std.) GPM	350 or 500 GPM
Material Used for Nozzle	Aluminum	Aluminum	Brass or Aluminum	Brass	Brass
Weight	7.5 lbs.	8.25 lbs.	31.5 lbs. or 7.5 lbs.	12.375 lbs.	19 lbs.
Quoted Output Range (lpm)	1135-3785 lpm	1135-3785 lpm	1135-4730 lpm	1325 or 1895 lpm	1325 or 1895 lpm
Delivery Times	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro
Unique Features	Max. flow @ 75 psi	Max. flow @ 75 psi	Max. flow @ 75 psi	FM Approved	U. L. Listed
Warranty	5 Years	5 Years	5 Years	5 Years	Five Years

ELKHART BRASS cont.

Model Number	CJN-B	CSW-LB	SM-2000	IMS	CJK
Product Name	Select-O-Stream	Select-O-Flow	Select-O-Matic	Select-O-Stream	MYSTERY nozzle
Origin	USA	USA	USA	USA	USA
Type of Nozzle	Constant Gallonage	Selectable Gallonage	Automatic	Constant Gallonage	Constant Gallonage
Sizes Available	2.5" swivel inlet	2.5" swivel inlet	3.5" swivel inlet	2.5" swivel inlet	3.5" swivel inlet
Configurations	750 or 1000 (Std.) gpm	350-500-750-1000-1250 gpm	Manual Operation 500-2000 gpm @ 80 PSI	350 or 500 (Std.) gpm	1250 or 1500 or 1750 or 2000 gpm
Material Used for Nozzle	Brass	Brass	Brass or Aluminum	Brass	Brass
Weight	15.5 lbs.	21.375 lbs.	38.75 or 9.2 lbs.	8.75 lbs.	22.25 lbs.
Quoted Output Range (lpm)	2840 or 3785 lpm	1325-1895-2040-3785-4730 lpm	1895 to 7570 lpm	1325 or 1895 lpm	4730 or 5680 or 6624 or 7570 lpm
Delivery Times	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro	Ex-Works 2-4 weeks aro
Unique Features	Also available in aluminum	Five flow rates in one nozzle	Max. flow @ 75 psi	140° wide fog	Max. flow @ 100 psi
Warranty	5 Years	5 Years	5 Years	5 Years	5 Years

Elkhart Brass Mfg. Co., Inc.
1302 West Beardsley Avenue
Elkhart
IN 46515, USA
Tel: +1 574 295 8330
Fax: +1 574 293 9914
Website: www.elkhartbrass.com

PROTEK

Model Number	818E	823-BC	835-BC
Product Name	**Remote Control Nozzle**	**Master Stream Nozzle**	**Master Stream Nozzle**
Origin	Taiwan	Taiwan	Taiwan
Type of Nozzle	Constant Flow	Constant Flow	Constant Flow
Sizes Available	1-1/2”	2-1/2”	2-1/2”
Configurations			
Material Used for Nozzle	Anodized Aluminum	Bronze	Bronze
Weight	3 KGS	5 KGS	6 Kgs
Quoted Output Range (lpm)	750, 950, 1325	1140, 1900, 2660	2840, 3785
Delivery Times	Within 2 Weeks	Within 2 Weeks	Wihtin 2 Weeks
Unique Features	Remote Control	‘Built-In’ Stream Shaper	Superior Reach & Peneration
Warranty	5 Years	5 Years	5 Years

PROTEK cont.

Model Number	847	848
Product Name	**Master Stream Nozzle**	**Master Stream Nozzle**
Origin	Taiwan	Taiwan
Type of Nozzle	Selectable Gallonage	Selectable Gallonage
Sizes Available	2-1/2”	2-1/2”
Configurations		
Material Used for Nozzle	Anodized Aluminum	Anodized Aluminum
Weight	2.5 KGS	3.5 KGS
Quoted Output Range (lpm)	1200-1600-2000-2400	1900-2900-3800-4800
Delivery Times	Within 2 Weeks	Within 2 Weeks
Unique Features	Adjustable Gallonage	Superior Reach & Peneration
Warranty	5 Years	5 Years

Protek Manufacturing Corp.
64 Kan Su Road, Section #2
Taichung, Taiwan
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Fax: +886-4-2422-8666
Website: www.protekfire.com

TASK FORCE TIPS

Model Number	M-R, M-RS, M-RF, M-I, M-IS, M-IF, M-H, M-ER	MONSOON-R, MONSOON-I, MONSOON-H, MONSOON-E	MT-R-6ASA & MT-HR-6SX
Product Name	**Master Stream**	**Monsoon**	**Typhoon**
Origin	Made In The USA	Made In The USA	Made In The USA
Type of Nozzle	Fixed, Selectable, Automatic Nozzle for a Portable or Fixed Deluge Gun	Automatic Truck Mounted Deluge Nozzle	Automatic Truck Mounted Deluge Nozzle
Sizes Available	65mm and 75mm	75mm, 90mm and 110mm	6” ANSI 150, DN150PN16, 6” Storz
Configurations	With or without Halo Ring, Hydraulic and Electric Remote	With or without Halo Ring, Hydraulic and Electric Remote	Halo Ring or Hydraulic Remote
Material Used for Nozzle	Lightweight hardcoat anodized aluminum.	Lightweight hardcoat anodized aluminum.	Massive cast hardcoat anodized aluminum bumper.
Weight	3.4 kg – 6.2kg	10.8 kg – 12.5kg	46.7 kg – 49.8 kg
Quoted Output Range (lpm)	600-4500 l/min @ 7bar	1100-7000 l/min @ 7 bar	2400-16000 l/min @ 7 bar
Delivery Times	1-4 weeks	1-4 weeks	1-4 weeks
Unique Features	Constant pressure regulated at 7bar. Continuously variable from straight stream to full finger fog. Flush without shutting down. Molded rubber bumper with power fog teeth.	Constant pressure regulated at 7bar. Continuously variable from straight stream to full finger fog. Flush without shutting down. Molded rubber bumper with power fog teeth.	Adjustment is anywhere between 6 and 8 bar by turning a knob on the front of the nozzle. For use on truck mounted deluge devices, fire boats and industrial applications.
Warranty	Task Force Tips warranty’s that our equipment shall be free from defects in material and workmanship for a period of five years from the date of purchase.	Task Force Tips warranty’s that our equipment shall be free from defects in material and workmanship for a period of five years from the date of purchase.	Task Force Tips warranty’s that our equipment shall be free from defects in material and workmanship for a period of five years from the date of purchase.

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2800 East Evans Avenue
Valparaiso, IN 46383, USA
Tel: +1 219 548 4000 Fax: +1 219 464 0620
Website: www.tft.com

AUTOFLUG

Dedication to the rescue and safety of people, this has been the objective of AUTOFLUG already since the first days of aviation. From the foundation of the company in 1919 right up to the present day, AUTOFLUG has remained a medium-sized family enterprise.

AUTOFLUG supplies humanitarian rescue services with safety systems such as inflatable life tents, inflatable decontamination tents and showers, inflatable rescue stretchers, inflatable dinghies and manifold accessories for all AUTOFLUG inflatable equipment.

AUTOFLUG rescue and safety systems incorporate the latest experiences, are based on newest materials and technologies and are meeting the highest requirements.

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Industriestrasse 10
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FSI OFFERS THREE AND FOUR LINE MASS CASUALTY PORTABLE HAZ MAT DECON SHOWER

Systems that can handle up to 4 non-ambulatory stretcher borne personnel, or up to 8 ambulatory victims at one time, or any combination of the above in the middle 13′ W x 10′ L shower area. The DAT4070S as shown offers private dry undress and redress areas in a 13′ W x 23′ L x 9′ H 300 sq. ft. unit

DATTM3060S THREE LINE MASS CASUALTY DECON SHOWER SYSTEM

FSI proudly offers the DATTM 3060S Three line, Mass Casualty, Portable Hazmat Decon Shower System built to the same demanding specifications as the entire line of FSI Shelters/Showers recognized by their EMS Blue Colour, in multiple sizes, with an integral ground floor that will hold up to 200 gallons of water before requiring pump out, 4 roll up windows, 2 skylights, full closure slip in and out dirty entry/clean exit doors, four – 14″ dia. HVAC/Clothes ducts, air inflation valve and hose, pressure relief valve, Pegs/Rods/Bag/Tie Downs, Repair kit, manual, carry bag, 2 upper air vents, and an extra full centre divider curtain to allow for changing the Shower to a 2 line non-ambulatory unit.

The DAT3060S is a true mass casualty shelter/shower system that offers private dry undress and redress areas in a three line Decon Shower configuration 10′ W x 20′ L x 9′ H (200 sq. ft.) that can handle combinations of up to 6 non-ambulatory, 2 ambulatory, 4 non-ambulatory and 1 ambulatory, or other possible showering combinations of personnel at any one time in the middle 10′ x 10′ shower area.

DATTM4070S FOUR LINE MASS CASUALTY DECON SHOWER SYSTEM FROM FSI

FSI proudly offers the DATTM4070S 4 Line Mass Casualty Portable Hazmat Decon Shower System built to the same demanding specifications as the entire line of FSI Shelters/Showers recognized by their EMS Blue Colour, in multiple sizes, with an integral ground floor that will hold up to 300 gallons of water before requiring pump out, 4 roll up windows, 2 skylights, full closure slip in and out dirty entry/clean exit doors, 4 – 14″ dia. HVAC/Clothes ducts, air inflation valve and hose, pressure relief valve, Pegs/Rods/Bag/Tie Downs, Repair kit, manual, carry bag, and 2 upper air vents.

The unit can handle 4 non-ambulatory stretcher borne personnel, or up to 8 ambulatory victims at one time, or any combination of the above in the middle 13′ W x 10′ L shower area. The DAT4070S offers private dry undress and redress areas in a 13′ W x 23′ L x 9′ H 300 sq. ft. unit.

For further information, please contact:
FSI North America
A Division of Fire Safety International
Fax: +1 440 891 1562
Website: www.fsinorth.com

THE FUTURE OF THERMAL IMAGING IS ALREADY HERE!

Many articles have been written recently about the “ultimate” thermal imaging solution consisting of the incorporation of a TIC into an integrated fire helmet.

Such a solution has been available for six years from **GB Solo Ltd.**, of Scunthorpe, U.K.

The SOLOtic is the ONLY fully integrated fire-fighting helmet in the World, incorporating breathing apparatus, face-mask, thermal vision and crystal clear communications. – 3rd generation SOLOtic.

This is the ultimate tool for the worst imaginable conditions!

In addition to civilian Fire Brigades, SOLOtic, along with the SOLOunifit, has continued to find its place in the specialised markets such as Cruise Liners, Commercial Shipping Lines, F1 Grand Prix teams, Oil Refineries, Tunnel Operators and Naval Forces around the World.

The SOLOvision FIRE is unlike any other thermal imaging camera. It can be used as a traditional hand-held or as a hands-free camera that has the unique ability to attach to, and create a seal with, the BA face mask to prevent any smoke, steam or dirt interfering with the picture display.

But how can SOLOvision’s, and SOLOtic’s camera display be positioned so close to the eyes without blurring and distortion of the image, as would occur with any other TIC?

All GB SOLO cameras operate with a patented display system. GB Solo processes the image from the camera sensor, using a Virtual Reality computer, so that the image presented to the user’s eyes is 1 metre square and is augmented with the users head. What the user sees is as though he/she were using their own eyes rather than that of the camera. The result is a perfect image – more than 60 times larger than the image seen through a TIC with only a 3″-5″ display – and two hands free to work with!

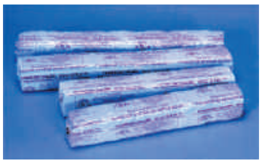
SOLOvision also happens to be the lightest TIC in the world, weighing in at only 850g in its heaviest configuration, the new Hand-Held, operating on 6 x AA batteries.

All cameras have the option of colour display, spot temperature and wireless transmission.

Recent Asia/Pacific orders for GB Solo helmets and cameras have come from Singapore S.C.D.F.; Korean Fire Department; various Fire Departments in China; and the Malaysian Armed Forces.

For more information, please contact:
GB Solo Asia/Pacific
Tel: +60-3-42527450
E-mail: jamesm@gbsolo.co.uk

A NEW FIRESTOP SPECIFICALLY DESIGNED FOR THE TELECOMMUNICATION INDUSTRY



RectorSeal announces its latest addition to its Metacaulk® line of firestopping products – Metacaulk® Bixi Stix™!

An extremely cost effective Firestopping material, Metacaulk® Bixi Stix™ functions as an effective intermediate fire-break within vertical cable tray runs. This highly intumescent material is specifically designed for the telecommunication industry. Metacaulk® Bixi Stix forms a high insulating char under fire conditions to prevent the passage of flame, smoke, and hot gases through concrete floors.

Metacaulk® Bixi Stix™ is UL classified to UL 1479 and is ideal for 12″ inch x 24″ inch openings in a concrete floor when a kick box is installed on the top of the floor. They are easy to install, saves money, and are repenetrable. It is an excellent Firestopping material for both new and retrofit construction.

Founded in 1937, RectorSeal® has grown steadily over the years through a commitment to providing high quality products and services. With a diversified business strategy, the company is aggressively pursuing new and unique technologies to serve the plumbing, hardware, heating, air conditioning, and construction markets both domestically and internationally. RectorSeal® is devoted to providing innovative quality products supported by strong customer and technical service.

For more information, please contact:
RectorSeal
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Fax: +1 713 263 7577

RESPONDING TO THE TERRORIST THREAT

“We are ready and able to respond as soon as we get the call,” says Tony Hughes Managing Director of **Hughes Safety Showers**, Britain’s leading supplier of decontamination showers and ancillary equipment. His comments followed concerns raised by a National Audit

Office report that claims a quarter of hospitals and a third of ambulance services do not have adequate plans for a terrorist attack and lack the necessary equipment.

"We supply emergency services around the world, as well as in Britain, with decontamination equipment capable of treating up to 300 people an hour in the event of a biological, chemical, radiological or nuclear attack." said Tony. "The equipment is available now and has been tested under a wide range of conditions. It's one certain way to save lives in a major incident."

Inflatable decontamination shelters can be quickly erected within hospital grounds. Walking and stretchered casualties are treated before entering the building, eliminating the risk of potentially dangerous substances being carried into the hospital. Ideally, this decontamination is carried out well away from the main hospital building although where necessary, walk-through shelters can be positioned at doors to process casualties as they enter.

"Decontaminating casualties at the scene is by far the best option and likely to save more lives," says Tony. "Early treatment means a better chance of survival."

Portable mass decontamination shelters can be carried on emergency service vehicles and erected in minutes. As well as providing a fast response, shelters used at the scene of an incident can help to reduce the pressure on hospital accident and emergency departments and prevent the contamination of ambulances, which would otherwise have to be withdrawn from service for cleaning.

For more information, please contact:
Hughes Safety Showers Ltd.
Tel: +44 161 430 6618
E-mail: sales@hughes-safety-showers.co.uk

TASK FORCE TIPS' NEW HANDLINE NOZZLE SERIES

Task Force Tips, Inc., a worldwide leader of innovative fire streams management solutions, announces the introduction of its newly re-designed Handline nozzles. Since 1986, TFT's 50-350gpm automatic Handline nozzles have been the fire service's most trusted and reliable fire suppression tools. With the addition of new flow and pressure choices, simplified field maintenance, the integration of lightweight polymer components, and now, complete NFPA #1964 Standard compliance, the new Handline nozzles will meet and exceed the next generation's fire streams management demands.

With flow ratings of 70-300gpm, the new automatic Handline nozzle will now offer 100psi, 75psi, or 55psi operational pressures. The new shut-off handle can now be color coded, and is produced from DuPont's new rugged lightweight ZYTEL® polymer. Meeting all aspects of the NFPA #1964 Standard, the new design also provides both improved field serviceability, and simple pressure control changes to meet changing operational demands.

For more information, please contact:
Task Force Tips, Inc.
Tel: +1 219 462 6161
Website: www.tft.com

TYCO SERVICES BUILDING PRODUCTS DEVELOPS SUPER FIRE DOOR FOR MALAYSIAN MARKET

Tyco Services Building Products has developed a fire door to meet Malaysia's stringent industry standards using 100% Australian sourced materials and technology. After testing the door local Malaysian authorities and manufacturers were astounded with the results.

Malaysian standards are considered more difficult to pass than Australian or British standards as Malaysia require a minimum of sixty minutes insulation making it twice as high as Australian standards. Tyco Services Building Products new fire door not only met the Malaysian standard (1073:Pt 3 1996) but, was also found to be half the weight of the locally manufactured doors and can be constructed much faster.

After the successful testing at Malaysia's testing authority Sirim, Tyco Services Building Products are now working to establish an exclusive agreement with an agent in Malaysia who has three well known fire door manufactures lined up to distribute the Tyco Services Building Products door to.

In the interim the door is known as the HD E Core (HD referring to high density). The HD E Core fire door is suitable in Malaysia for all high rise residential unit entry doors, public buildings and anywhere that fire protection is required such as hospitals, shopping centres, cinemas and educational institutions.

For more information please contact:
Tyco Services Building Products
Tel: +61 2 9938 5499
Website www.tycobp.com.au

PPS INTRODUCE DEDICATED DECON INCIDENT SUIT RANGE

What is believed to be the first dedicated range of protective suits designed not just to embrace every area of a decontamination incident, but also for use in decontamination-incident training, is being offered by **Professional Protection Systems.**

There are four suits in the new range. The first is designed as an incident control suit, the second is a full decontamination suit, the third is an NBC escape suit and the fourth has been designed for training purposes.

Incident Control (cold zone) suit: A chemical-splash suit made from Zytron 300 this suit features a double storm flap, zipped front and elastic wrist and face apertures. A full-face chemical respirator provides airflow demisting for a low profile polycarbonate visor. This features the option of easy to attach internal spectacle frames.

A multi purpose combination filter manufactured from micro fibre and organic compounds offers a particulation retention efficiency of 99.999 at 95 litres per minute. The suit is completed with slip roof safety boots and neoprene gloves. The boots are both chemical and oil resistant and can stand hot contact up to 300°C. Non-slip and resistant to UV and Ozone the gloves are chemical resistant to EN374 and offer mechanical protection up to EN 388.

Full Decontamination Suit: A chemical splash suit made from Zytron 400 this all enveloping one piece comes with a clear PVC visor with a Teflon overlay. If features a unique neck seal and an internally worn air blower system with combination filtering canisters. The blower unit is manufactured from Polycarbonate/ABS and is powered by a nickel metal hydride high capacity battery with an eight hour run time. Weighing 2258gms it features a chargeable on or off power unit and a battery lock system. It has a lock bayonet hose connector, an audio and visual battery alarm in the event of a blocked filter and an intelligent battery charger that prevents overcharging.

Boots and gloves are the same specification as the Incident Control Suit.

NBC Escape Suit: When tested by the US Army Soldier Biological Chemical Command it was established that this suit's respiratory factor exceeded US army requirements. One of the features of this suit is the hood. It has been deliberately designed with plenty of space as an anti-claustrophobic feature. This means it can accommodate larger head sizes or an unusually full head of hair, as well as somebody wearing spectacles, with ease. The large visor on this unit has a permanent anti-fog coating and provides the wearer with a wide and clear outward view.

Breathing is via a snorkel type mouthpiece. This is sealed through the front of the hood and attached to a plastic cartridge. A gas tight seal is formed between the wearer's lips and the mouthpiece so that the air inside the mouthpiece is completely isolated from the air inside the hood. This means that if the integrity of the hood or the neck seal is compromised, for any reason, the wearer can still enjoy clean air though the mouthpiece.

Training Suit: Because all the "front line" suits in the PPS decontamination range are as a matter of necessity of limited life it would not be economic to use them in a training situation. For this reason PPS have developed a training suit which simulates the wearing characteristics of the others in the range but at a fraction of the price.

Made from lightweight PVC and clearly marked "training suit" this unit is a simple one piece with an optically clear PVC visor and a standard non-gas tight zip across the chest. It features an internally worn air blower system.

For more information, please contact:
Professional Protection Systems
E-mail: sales@ppsgb.com
Website: www.ppsgb.com

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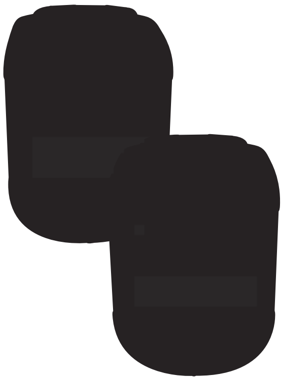

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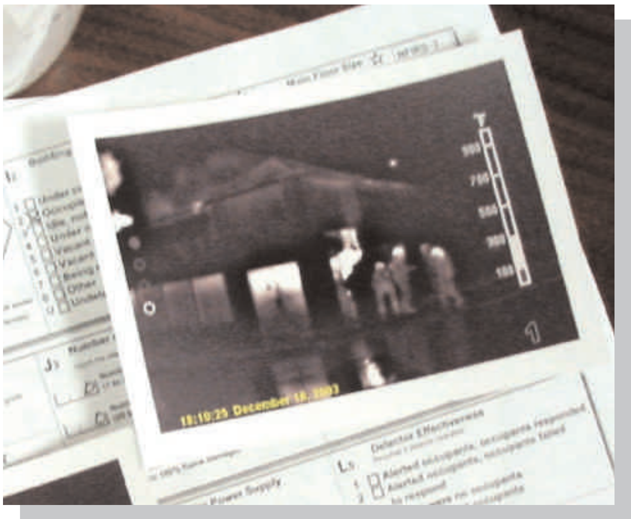

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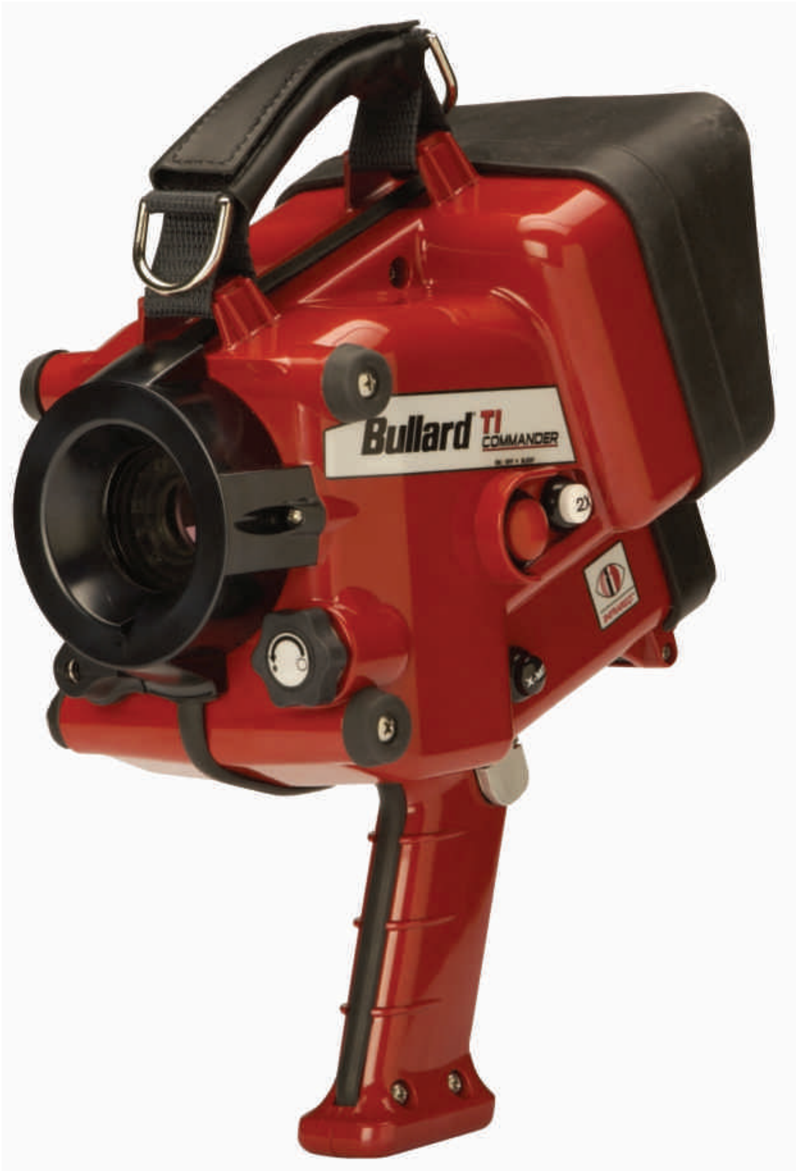

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FOREWORD

by Jeff Godfredson

NFPA's Asia-Pacific Operations Director

TERRORISM and FIRE SAFETY

At the current time the issue of protection against the acts of terrorists is very high in the minds of designers, regulators and emergency responders. Such concerns are appropriate in the ever changing world in which we live. Issues of safer design will only affect new buildings. Whilst it is possible to upgrade existing high profile targets most current building stock will not be affected by any changes in design or regulations.

My concern is that with the focus on these rare events (but with acknowledged tragic consequences) we may loose sight of the basics. Currently the only escape provisions in buildings are there for fire safety but as events at the World Trade Centre so clearly indicated these means of egress are used by people to escape the actions of terrorists, which may or may not result in fire.

We have had nearly a century of experience of fire in high-rise buildings; there are many, many case studies from which we can learn the lessons of history. We have the science to fully understand the effects of combustion and it's by products on humans. We know that a properly designed and maintained sprinkler system will protect life and property in most fires. We know that properly designed egress systems that are readily accessible at the time of the fire or other emergency makes a huge difference in the potential survivability for the occupants.

My question is why is it that in most cities in the world it is very easy to walk into buildings of public assembly (such as shopping malls, nightclubs, hotels, etc.) and find many breaches of law and commonsense, (such as locked and blocked exit doors). Do we have to do a better job of public education or of enforcement or both?

If we cannot make our buildings safe in the event of accidental fire what hope do we have of improving safety in the event of terrorist activity?

Fire safety is too important to assume that somebody else is looking after it on our behalf. We all need to be conscious of our environment and report breaches of the means of egress to the appropriate people for action.

Perhaps if we could get these basics right we may even be safer in the event of terrorist activity.

Jeff Godfredson
NFPA's Asia-Pacific Operations Director

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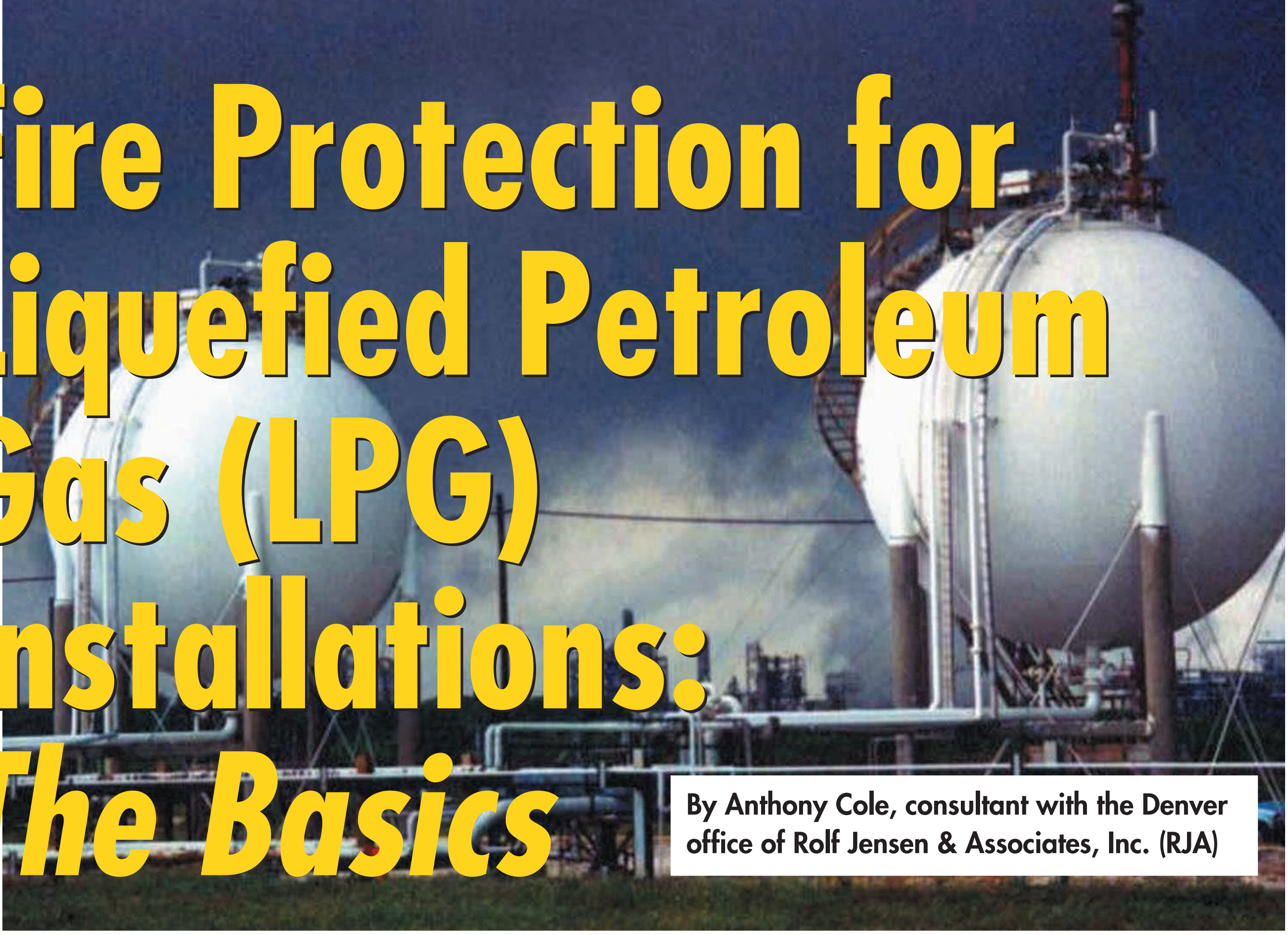
Fire Protection for Liquefied Petroleum Gas (LPG) Installations: *The Basics*



By Anthony Cole, consultant with the Denver office of Rolf Jensen & Associates, Inc. (RJA)

Pic courtesy of RJA

IN DEVELOPING FIRE PROTECTION METHODS and guidelines for liquefied petroleum gas (LPG) storage facilities, the chief concern is a massive failure of a vessel containing a full inventory of LPG. The probability of this type of failure occurring can be mitigated or at least controlled to a reasonable and tolerable figure with appropriately designed and operated facility. Since most LPG fires originate as smaller fires that become increasingly more dangerous, this article will focus on fire protection methods and guidelines in relation to small leaks and fires in LPG spheres. Of greater importance to the fire protection engineer is the more likely event of a leak from a pipe, valve, or other attached component leading to ignition, flash fire, pool fire, and eventually to a pressure fire at the source.

DEFINITION AND PROPERTIES

LPG was first discovered in the 1900s. The applications and uses of LPG, which range from cooking and refrigeration to transportation, heating, and power generation, make it an all-purpose, portable, and efficient energy source. LPG consists of light hydrocarbons (propane, butane, propylene, or a mixture) with a vapor pressure of more than 40 psi at 100°F. At standard temperature and pressure, LPG is in a gaseous state. LPG is liquefied by moderate changes in pressure (i.e. in a process vessel) or a drop in temperature below its atmospheric boiling point. The unique properties of LPG allow for it to be stored or transported in a liquid form and used in a vapor form. LPG vapors are heavier than air and tend to collect on the ground and in low spots. After LPG is released, it readily mixes with air and could form a flammable mixture. As a release occurs, there will be an area closest to the release that is above the flammable range, an intermediate area that may be in the flammable range, and areas that will be below the flammable range. Mixing, natural currents, and diffusion of LPG vapors affect the size and extent of these areas. If these processes continue, eventually the mixture is diluted to below the lower flammable limits (LFL).

Other characteristics of LPG include:

- LPG exerts a cooling effect as a result of vaporization due to releases at low pressure (as called autorefrigeration).
- The density of LPG is almost half that of water, therefore water will settle to the bottom in LPG.
- Very small quantities of liquid will yield large quantities of vapor.

Properties of Two Common LPGs

PROPERTY	PROPANE	n-BUTANE
Specific Gravity	1.5	2.p
Vapor Pressure (at 60°F)	105 psia	26 psia
Boiling Point	−44°F	+31°F
Cubic feet of gas/gallon of LPG at 60°F	36.4 ft^3	31.8 ft^3
Lower flammable limit (LFL) % in air	2.0	1.5
Upper flammable limit (UFL) % in air	9.5	9.0
Gross Btu/ft^3 of gas at 60°F	2,516 Btu/ft^3	3,262 Btu/ft^3

Table 1 from 1996 edition of API 2510A

Tank Pressures for Two Common LPGs

LIQUID	QUANTITY	VAPOR VOLUME (gal.)	VAPOR VOLUME (ft^3)	VOLUME of GAS/AIR MIXTURE at LFL (ft^3)
Propane	1 gal.	270	36	1,680
n-Butane	1 gal.	230	32	1,630

Table 2 from 1996 edition of API 2510A

Pic courtesy of RJA

Vapor Volumes Obtained for Two Common LPGs

LIQUID TEMPERATURE	PROPANE	n-BUTANE
31°F	50 psig	0 psig
60°F	90 psig	11 psig
100°F	175 psig	37 psig
130°F	250 psig	65 psig
140°F	290 psig	80 psig

Table 3 from 1996 edition of API 2510A

- When vaporized, LPG leaves no residue.
- When LPG evaporates, the autorefrigeration effect condenses the surrounding air, causing ice to form. This is usually a good indication of a leak.
- LPG is odorless, therefore, agents such as ethyl mercaptan are added to commercial grades in most countries for better detection.

PRODUCTION AND OPERATIONS

LPG is derived from two main energy sources: natural gas processing and crude oil refining.

When natural gas wells are drilled into the earth, the gas released is a mixture of several components. For example, a typical natural gas mixture may be (90%) methane or "natural gas", while the remaining percentage of components (10%) is a mixture of propane (5%) and other gases such as butane and ethane (5%). From there the gas is shipped in tankers or via pipeline to secondary production facilities for further treatment and stabilization. From these facilities it is sent by bulk carrier or pipeline to various industrial plants and gas filling facilities or used for power generation.

LPG is also collected in the crude oil drilling and refining process. LPG that is trapped inside the crude oil is called associated gas. The associated gas is further divided at primary separation sites or Gas Oil Separation Plants (GOSP's), Central Processing Facilities (CPF's) for offshore installations or Drilling, Production, and Quarter's Platforms (DPQ's). At these facilities, the produced fluids and gases from the wells are separated into individual streams and sent on for further treatment.

At refineries, LPG is collected in the first phase of refinement or crude distillation. The crude oil is then run through a distillation column where a furnace heats it at high temperatures. During this process, vapors will rise to the top and heavier crude oil components will fall to the bottom. As the vapors rise through the tower, cooling and liquefying occurs on "bubble trays," aided by the introduction of naptha. Naptha is straight run gasoline and generally unsuitable for blending with premium gasolines. Therefore, it is used as a feedstock in various refining processes. These liberated gases are recovered to manufacture LPG.

In commercial applications, LPG is usually stored in large horizontal vessels called "bullets." These bullets can range in volume size from 150 to 50,000 gallons. In industrial applications, LPG is typically stored in large vessels that are sphere or spheroid shaped. These are the large "golf ball" shaped and oval vessels commonly seen at refineries and other similar occupancies. In this article, we will deal primarily with the protection of LPG spheres.

STANDARDS

Various sources of standards and codes exist for dealing with LPG facilities and proper fire protection. Some of these sources include:

- NFPA 54, *National Fuel Gas Code.*
- NFPA 58, *Liquefied Petroleum Gas Code.*
- NFPA 59, *Utility LP-Gas Plant Code.*
- American Petroleum Institute (API) 2510, *Design and Construction of LPG Installations.*
- American Petroleum Institute (API) 2510A, *Fire-Protection Considerations for the Design and Operation of Liquefied Petroleum Gas (LPG) Storage Facilities.*
- IP Code of Practice for LPG

Additional sources of information can be obtained from various organizations such as the British Standards Institute, the World LP Gas Association, The LP Gas Association, and industry producers and suppliers. For the purpose of this article, we will focus on some of the above-mentioned sources that are typically accepted as the industry standard.

FIRE PROTECTION DESIGN CONSIDERATIONS

In order to reduce the fire risk at LPG facilities, adherence to various design considerations and requirements such as layout, spacing, distance requirements for vessels, drainage, and containment control will help to limit the extent of fire damage. Additional considerations such as fireproofing, water draw systems, and relief systems are also important with respect to the integrity of the installation and the reduction of risk. These considerations address the various ways to prevent leaks or releases that may lead to a fire.

Equally as important to the prevention of a leak or release is properly designed, installed, and maintained fire protection systems. These systems attempt to minimize or limit the fire damage once a fire occurs. In the situation that a fire does occur, the levels of required fire protection are affected by several factors such as location and remoteness of the fire and the availability of water.

To determine if cooling water is required, the anticipated radiant heat flux from an adjacent tank, maximum tank shell temperatures if the vessel shell is not cooled, and other specific risk management guidelines must be analyzed. API 2510A contains a procedure to identify the point at which cooling water should be applied based on the size of the pool fire and the distance

Over 65% of confined space fatalities are would-be rescuers.

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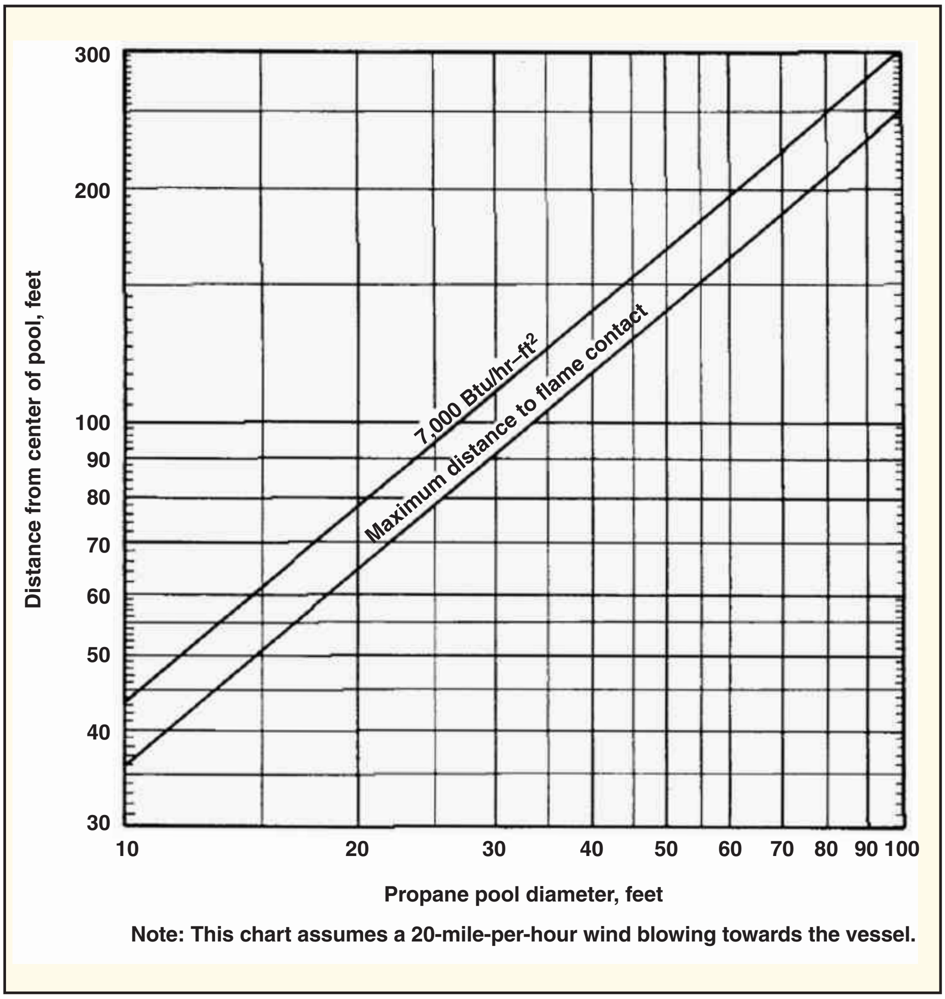

Figure 1. Pool Fire Radiant Heat Flux, from 1996 edition of API 2510A.

between the vessel and the center of the fire (Figure 1.) Additionally, an analysis of the relief valve parameters is necessary to maintain certain internal vessel pressures. Although computer models are available to more accurately anticipate the heat fluxes, this procedure helps to determine if a more detailed study is required.

Figure 1 considers the radiant heat flux from a pool fire, assuming a 20-mile-per-hour wind. To illustrate this procedure, first locate the diameter of the pool fire along the x-axis. Using an imaginary line from the designated point along the x-axis, locate the corresponding point of intersection on the 7,000 BTU/hr-ft^2 line. Next, extend an imaginary horizontal line to the y-axis. The corresponding point of intersection on the y-axis is the distance between the vessel and the pool fire at which cooling water must be applied. For example, if a pool fire is 30 feet in diameter, it is necessary to apply cooling water when the distance between the vessel and the center of the pool fire is approximately 120 feet.

In general, there are three primary methods that can be used to apply water for cooling or extinguishment to LPG vessels exposed to fire. The three methods are: water deluge, fixed monitors, and water spray. Additionally, portable equipment such as ground and

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Vision Systems

Various Applications of Water for LPG Sphere Fires

Application Method	Advantages	Disadvantages
Water Deluge	1. Rapid activation 2. Can be automatic 3. Lack of plugging	1. Problems with wettability 2. Possible water spray supplement for legs 3. Effectiveness with jet fires
Fixed Monitors	1. Ease of activation 2. Can be automatic 3. Effective for jet fires	1. Exposure to operators 2. Wind 3. Large water demand 4. Monitors may be changed unknowingly
Water Spray	1. Rapid activation 2. Wettability and run down 3. Can be Automatic	1. VCE damage 2. Plugging 3. Effectiveness with jet fires
Portable Equipment	1. VCE damage not an issue 2. Specific application to area 3. Portability for multiple hazards	1. Prolong set-up times 2. Manual 3. Exposure to operators

Table 1 from 1996 edition of API 2510A

trailer mounted monitors can be utilized, but should not be considered a primary means of water delivery. This is mainly due to the potentially extended set-up times, logistics, and requirement of human intervention that is not necessarily reliable.

The table above describes some of the advantages and disadvantages of the 3 primary water application methods and the use of portable equipment.

The first method involves the use of a water deluge system and some form of water distributor. This could include high-volume spray heads, perforated pipe or a distribution weir. An underflow or overflow weir is a form of distribution weir that allows water to be evenly distributed over the surface area of a sphere by water flowing up the piping network, over the top of the sphere, and out of the weir. This type of water distributor is commonly used but is prone to corrosion from standing water and clogging and requires increased preventative maintenance. Additionally, weirs may not be as effective on bullets and are often greatly affected by wind. The remaining components of this method are similar to other deluge installations. The typical deluge system contains a supply piping network, deluge valve and trim, and a branchline-piping network near the top of the sphere. Newer installations are usually activated automatically, whereas older installations are commonly activated manually. The decision as to which activation method to use requires evaluation of spacing, available protection, exposures, and other factors.

The principle behind the use of a deluge or weir system for LPG sphere protection is that the geometric shape of the sphere and gravity work together as an advantage. As water is applied to the top of the vessel, the shape of the sphere and the force of gravity facilitate the flow of the water as it covers the surface area of the vessel. This type of protection is very effective to facilitate an even distribution of water over the surface area. Caution should be exercised, however, because paint, corrosion, dust, and other environmental influences can cause changes in the surface of the sphere, resulting in uneven water distribution. Additionally, settling and other conditions inside the weir can also cause uneven water flow over the sphere's surface.

Fixed monitors, the second method of water application, permit the use of fixed hydrant mounted monitors or individual monitors connected to the fire main to apply water to the fire area. In this case, water application is accomplished by operators manually opening valves to allow the flow of water to the LPG sphere. This procedure exposes operators to high heat fluxes and places them dangerously close to vessels under fire conditions. It is important to carefully study the plant and vessel layout if this method is elected. Proper placement, location, and quantity of fixed monitors must be reviewed and field tested to ensure that proper application and even distribution of water to all parts of the vessel is accomplished. In some cases, remote activation and operation is suggested when proper spacing of monitors is not a possibility. Additionally, annual testing and preventative maintenance are necessary to ensure parameters have not changed and that coverage is still adequate.

The third method of application is the use of water spray systems. These are systems that are comprised of a piping network of spray nozzles that distribute water over the surface area of an LPG sphere. The spray nozzles are positioned to form a grid pattern which facilitates the complete coverage of the sphere's surface area. Larger orifices and piping should be considered to help reduce blockage due to scale and mussel build-up and other potential problems. It is also important to properly size the strainer to prevent blockage. Inspection of strainers should be part of the preventative maintenance program.

The last method available is the deployment of portable monitors and

Pic courtesy of RJA

hoses. Although not one of the three primary methods of water application, preparations and planning for this type of application should not be forgotten.

When utilizing the four water application techniques discussed previously, a combination of techniques provides ample fire protection; a deluge or water spray system and portable monitors. A combination of a water deluge/distributor with a fixed water spray system with portable monitor back up from the fire department provides excellent coverage.

A water application rate for these fixed fire protection systems depends on the type of fire situation. When a vessel is exposed to only radiant heat without direct flame contact, a density of 0.1 gpm per square foot of vessel surface area is the minimum. If direct flame contact, or impingement, occurs, a density larger than 0.1 gpm, up to 0.25 gpm per square foot of vessel surface area is the minimum.

For fixed or portable monitors, 250 to 500 gpm is the minimum. However, field verification and flow testing is necessary to ensure adequate and proper coverage is provided. Placement of monitors must also be field verified against approved plans to ensure acceptable spacing and access.

Vapor, heat, or flame detectors mounted in the vicinity of a vessel can complete automatic activation of these systems. The use of vapor detection provides early detection and warning, but activation of water application systems must be confirmed through flame detection. Flame detection provides quick activation, but use caution when positioning these detectors to prevent false activation from sunlight. Consideration need also be given to the installation of UV/IR combination detectors to reduce the false indication rate. These devices require testing and preventative maintenance programs. An evaluation of the facility is necessary in order to determine the correct type and location of devices.

RESPONSE

Even with the proper installation of fixed fire protection system, the importance of emergency response to LPG fires cannot be disregarded. LPG fires can escalate quickly, and a lack of manual activities by the fire department can lead to vessel failure. As part of this response, an up-to-date and complete emergency response plan is an integral part. The plan should include:

- Hydrant layouts
- Hose lays and lengths
- Multiple response approaches (wind dependant)
- Vessel inventories
- Fixed protection information
- Scenarios for both un-ignited and ignited leaks

Other important factors include fire department capabilities and mutual aid agreements. Proper training and drills are also required to reduce the risk of injuries and promote a quicker and safer response to LPG events.

CONCLUSION

Since most LPG fires originate as smaller fires that become increasingly more dangerous, the use of the three primary methods to apply water in a quick manner can help reduce the risk of LPG vessel failure. The deployment of portable monitors and hoses, although not one of the three primary methods of water application, is an important back up to the primary methods. LPG fires can escalate quickly and a lack of manual suppression activities by the fire department can lead to vessel failure. It is necessary, however, to take control of the fuel source before attempting to suppress the fire. In any case, an emergency response plan, along with proper training and drills, is important to reduce the risk of injuries and promote a quicker and safer response.

Anthony Cole is a consultant with the Denver office of Rolf Jensen & Associates, Inc. (RJA). To learn more about RJA, visit their website at www.rjainc.com.

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PRODUCT PROFILE

VISION SYSTEMS

releases the VESDA LaserFOCUS Air Sampling Smoke Detector

Cost-effective very early warning smoke detection for small areas

While it is accepted and practiced that very early warning is critical for the protection of equipment of high replacement value or high operational dependency, it is often difficult to justify the same level of protection of less critical areas. Small telecommunication switch rooms, distribution and control hubs in utility and transport industries are examples of small spaces that, if affected by fire, would have a significant business impact. The VESDA LaserFOCUS was developed to provide cost effective very early warning smoke detection for these types of environments.

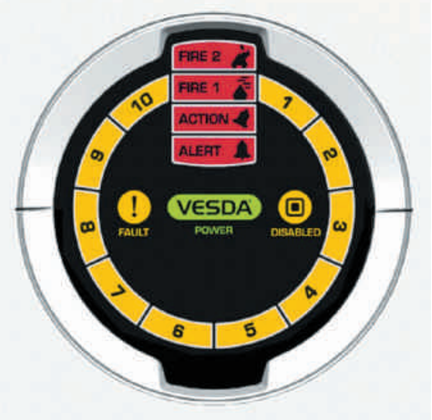
Improved Usability with the Revolutionary New Display

The first thing noticeable about the VESDA LaserFOCUS is the new circular display.

The display includes a smoke dial that intuitively communicates the level of fire threat relative to the Fire alarm. This allows the user to immediately assess the risk, even from a distance, and to respond appropriately to the level of alarm. Traditional linear bar graphs require the user to approach the detector to determine the threat and even then are sometimes not easy to interpret.

VESDA detection technology

The VESDA LaserFOCUS uses a detection technology directly derived from its VESDA parentage – the LaserPLUS, LaserSCANNER and LaserCOMPACT. This detection technology minimises the effect of the variations of particle-size produced by different fire types. Two design features of the VESDA range that ensure reliability over the lifetime of the product are the dual-stage filter and the incorporation of a clean air bleed in the detection chamber. The filter takes out very large smoke particles that could interfere with smoke measurement and contaminate the chamber. The clean air bleed provides a positive pressure barrier for critical components in the detection chamber, stopping dust or smoke being deposited on optical surfaces.



Ultrasonic flow sensing

Point smoke detectors take a single sample point and extrapolate that individual sample to represent the entire environment. Air sampling systems have a significant advantage over that approach as they draw multiple air samples back to a central detector, providing a more accurate interpretation of the environment as a whole. With the detection system function being reliant on airflow, monitoring and understanding it is critical. The VESDA LaserFOCUS is the first air sampling system to use ultrasonic sensing to continuously monitor the flow of air through its pipe network.

Advantages

In an air sampling smoke detection system, ultrasonic flow sensing offers many advantages over other flow sensing technologies:

- tolerance of contamination,
- immunity to temperature changes,
- not affected by altitude
- absolute flow measurement in litres per minute, rather than a relative measurement of the change in flow.

These elements contribute to a high level of reliability for the lifetime of the product and, more importantly, provide absolute flow measurement – measurement regardless of the temperature, elevation of the environment or the contamination of the flow sensors.

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AutoLearn™

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Extending the VESDA product family

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PPE – Helmets & Accessories

By Lei Wendling, Clarisse Granpierre and Paul Craig

Pic courtesy of MSA Gallet

WITH AN INCREASING RANGE of hazards to which fire-fighters can be exposed, the high performance Personal Protective Equipments are so essential to ensure their safety and security. Thanks to a continuing evolution and development of new safety equipments, fire fighters are able to be better protected and comfortable in various emergency missions.

When it comes to fire fighting helmets, fire fighters face an abundance of choices because of different standards and technologies. Many international standards such as EN, NFPA and ISO have helped to drive the product research and development and to identify the safety capability of each helmet. It is true that significant changes in helmet designs and materials had been made since the last decades. The heavy stainless steel helmet is very old fashion and intends to disappear. People prefer much more the sleeker modern design helmet than the old conventional helmet shapes. Many manufacturers are applying new technologies to improve the face heat resistance by using different face shields and eye screens. Because of the increasing requirement for global protection and comfort, manufacturers are also looking for different conceptions such as neck curtain, facemask adapters and suspension system.

Pic courtesy of MSA Gallet

FIREFIGHTING HELMET RANGE

During the seventies, the Paris Fire Brigade (Brigade des Sapeurs Pompiers de Paris) had decided to launch a tender for a new generation of fire fighter helmet in order to replace the old stainless steel ones that were only available at that time. A French company, Gallet, had been selected to work in very tight collaboration with fire fighters for the project. The very first result came in 1982 with the new and totally revolutionary concept compared to traditional ones. The most outstanding difference of the F1 Helmet was the jet-style enveloping helmet shell, which protected not only the head but also the face and the neck. Indeed, due to the development of dangers and risks endured by fire fighters, the new helmet had to fulfil an integral head protection.

The second big difference resided in the technology of the material used for the shell: instead of aluminium or steel, the new helmet was made of thermoplastic material nickel coated,

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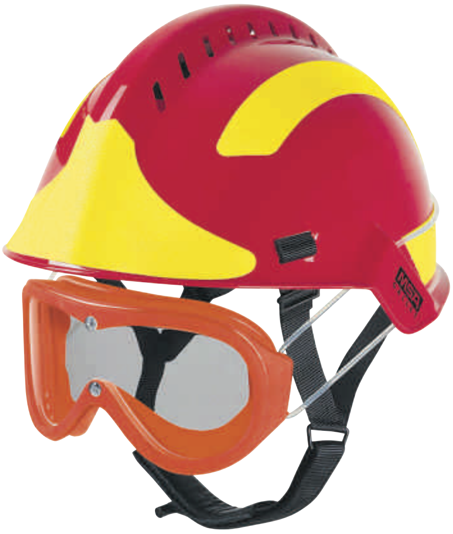
which was absolutely efficient to protect against heat and shock. Because the thermoplastic material is a weak conductor of energy, while the aluminium and steel were fully heat conducting materials, although the helmet remains intact.

At the beginning, this new style of helmet led some doubts in the firefighting world because of its revolutionary concept. But step-by-step it became the new reference in France, and then started the same ascension in other countries. Many such helmets are in every day use in more than 70 countries in the world for live-saving missions.

In the nineties, the competition of new generation fire fighting helmets continued among international manufacturers. Some helmet ranges like F200 / F300 from Germany, F600 from the UK began to enter in the market. Others prefer to produce similar helmet design as the F1 but with different materials and accessories. Later, two more helmet types were launched by the original designer and manufacturer of F1, called F1S and F1SA. In particular, the helmets outer shell was made of a special polyamide compound to provide extraordinary resistance against heat. These helmets were also equipped with a transparent or gold plated face shield for heat radiation protection, protective goggles, complete shock absorption system and integrated neck curtain in Aluminium or Wool.

In 1997, the new European standard EN443 was launched for firefighting helmets. A market study has been made



F1 helmet *Pic courtesy of MSA Gallet*

Pic courtesy of MSA Gallet

beside customers regarding the helmet and specialists had noticed that human heads in general intended to grow, with a size sometimes superior to 63 cm! Because of this most manufacturers offer a number of sizes throughout their range.

In the same time, according to fire fighters' requirement, the interior of the helmets was modified in order to make it more practical to adjust the helmets fit. These new systems allow fire fighters to adjust quickly the helmet size on their head and assure an optimal comfort and fit.

FIRE FIGHTING AND TECHNICAL RESCUE HELMET

Fire Fighters are not always called out to face fires. They also respond to many other call outs such as Earthquakes, Structural Collapses, High Angle Rescue, Forest Fires and many more in which a Fire Fighting Helmet is not practical. Most manufacturers offer helmets that offer the same typical characteristics of a fire fighter helmet – light weight, mobility, comfort and multifunction, but are much more versatile to the rigours of the job at hand.

ACCESSORIES

More and more end users are looking for integrating additional safety equipments, for example breathing apparatus, flashlights and infrared cameras. Most helmets available are also designed to integrate with proprietary radio communication systems even while wearing a facemask or breathing apparatus.

In terms of choice of flashlight, there are certain criteria that are important to consider: Easy to use, practicability, brightness and helmet fixation for usage in different situations. Photo luminescent Flashlights are highly recommended to be used within industrial and fire applications for its

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PPE – Helmets & Accessories

power, lightweight and easy fixation on helmets and belts. They are usually made of a rigid corrosion proof ABS body and a high impact polycarbonate lens. They have Xenon lamp modules, which give an extremely bright, white beam, penetrating water, smoke, fog and rain making it a perfect light source for all applications.

Thermal Imaging Cameras (TIC's) have come a long way in the last 12 months, with a new breed of smaller and lighter cameras available on the market. This also led to an increase in demands from the user for new ways to use the cameras and get more out of this exciting new fire fighting tool.

One such development is the use of Wireless Video Image Transmission from the TIC to a remote Video Receiver, allowing those outside of the "hot-zone" to see what is happening inside. This capability is an excellent tool, not only to assist the training in the use of the TIC itself, but also in the training of fire fighting techniques. A natural progression was the desire to allow those on the outside of a real life incident to see what was going on inside, in real time, with the fire fighter at the front line.

Pic courtesy of MSA Gallet

While Wireless Video Transmission systems were confined to use in the training ground the performance of the equipment was not challenged too much by the surrounding environment. Training buildings and "flash-over" containers do not present a tough challenge in getting the radio signal from the camera to the receiver without too much interference. However, as systems are deployed more and more into the field, the big challenge is the huge variety of construction methods and materials in the buildings, tunnels and urban spaces where fire fighters may need this equipment.

Wireless Video Transmission systems

GET IN, GET ON, GET OUT WITH...

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The SOLOvision is a fully operational thermal imaging camera with Virtual Reality Viewing Optics. The light weight and unique ergonomic design enables "hands free" operation.

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Pic courtesy of MSA Gallet

work best in line of sight since any obstruction between the transmitter and receiver will degrade the signal strength. However, fire fighters rarely have the luxury of a clear line of sight and it is not an option to change the construction of the environment so the only option of improving performance is in the design of the Wireless Video Transmission systems itself.

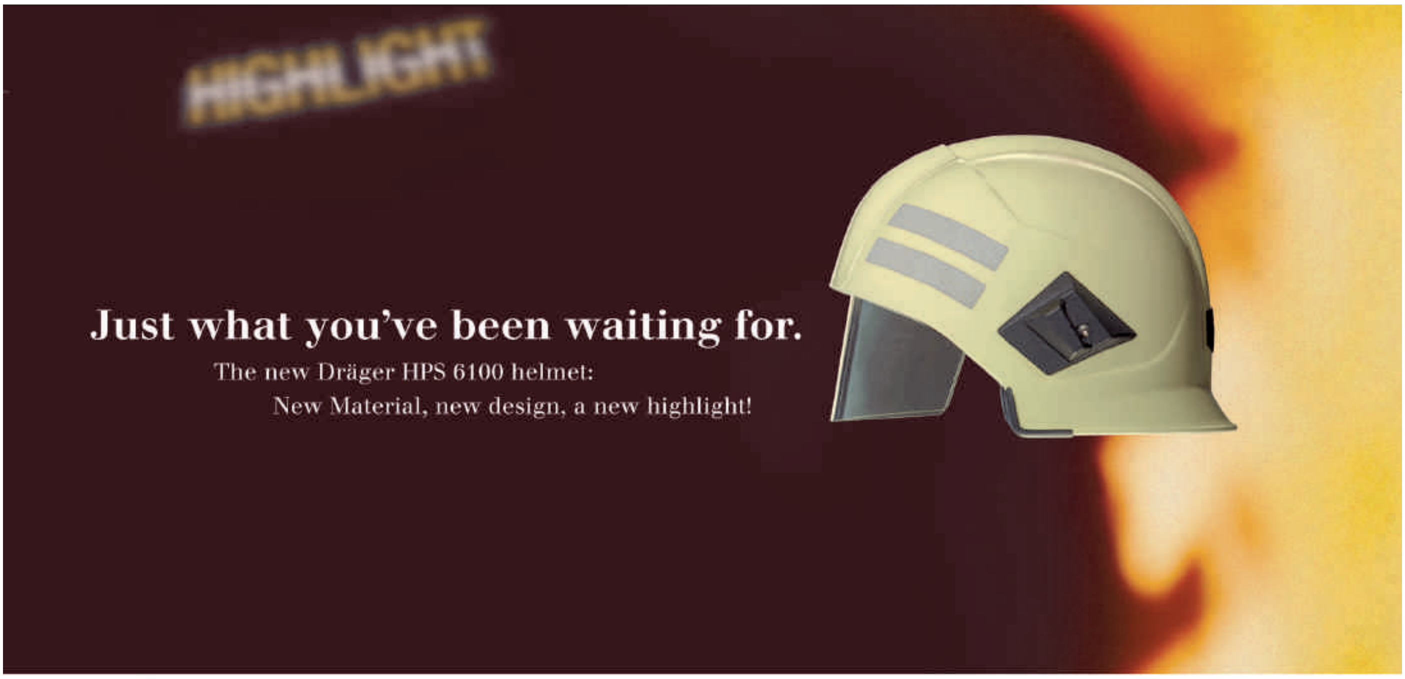
The choice of transmission frequency and output power is also a very important one. Here we not only have to decide what is best suited to the environment and application but also what is allowed under the many regulations controlling the radio frequency spectrum. Some systems are so flexible that they allow you to set frequencies depending upon the region the system will be used in. As to the output power of the system, it is not as simple as "more is better". While it is necessary to have a certain power to get the signal from A to B, too much power in some circumstances may simply create more reflections with very unsatisfactory results.

The transmitter booster was also a major consideration in terms of location. The heat it generates is detrimental to the performance of the sensitive IR detector inside the camera therefore putting the booster in an external housing eliminates any thermal management issues.

A standalone system also offers operational benefits to the fire department. Systems are available now which can be added or removed from any TIC in seconds, allowing deployment to any rescue team as and when necessary.

It is obvious that there are limitations to transmission systems in some demanding environments. However, by paying particular attention to the design of the system it is possible to achieve a level of performance that is perfectly useable in the field.

In the future these types of systems will become more and more common on the fire ground as more applications are identified with use and experience. It must be remembered though that these are only tools to aid the fire fighter and can never replace operating procedures and safe working practices, which are the fire-fighters primary safeguards in their work.



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Communications – the vital requirement

By Bob Gaskell
Helmet Integrated Systems Ltd

Enhanced firefighting communications capability in confined spaces

BY NATURE OF THE VARIED and extreme operational conditions they experience, the fire and emergency services have particularly demanding communications requirements. Confined spaces, high temperatures, high levels of ambient noise, all combined with the stress and rigour of the work being undertaken, make good radio communications a vital necessity.

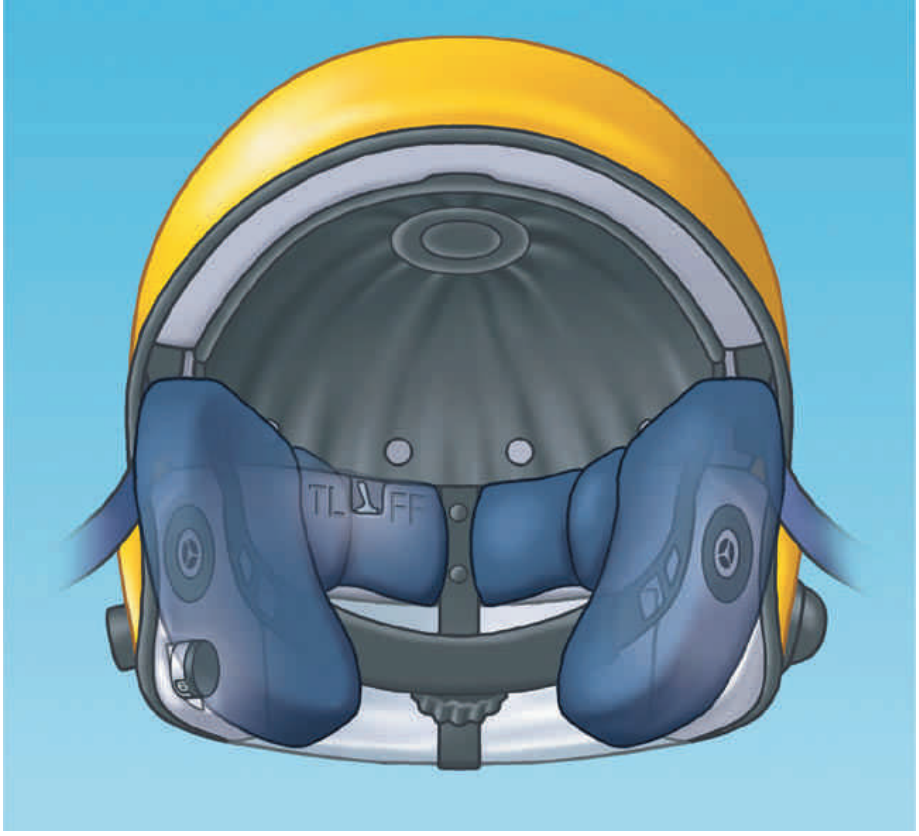
Technological advances in handheld radios have improved transmission and reception performance dramatically in recent years. However, 'line of sight' performance and signal strength are only part of the requirement, having less effect for example, in below deck marine fire fighting, or underground rescue operations, where ease of operation, close proximity teamwork, restrictions from other equipment being worn, and the ability to overcome high ambient noise levels are paramount.

There are a number of interface options that enable a radio to be used in 'hands free' mode rather than directly through the integral microphone and receiver. The most common forms of interface are to fit a separate microphone and receiver to a breathing apparatus facemask, or to attach the components to the inside of the helmet by means of a headband. In both cases transmission is made via a push to talk unit (PTT), generally attached to the protective clothing or harness, and connected to the radio via a downlead.

The main advantage of the headband system is that this can be easily moved from helmet to helmet as required, and enables the system to be used during operations that do not require the wearing of a breathing apparatus.

Regardless of the advantages of the hands-free system, there are circumstances where the various connecting leads and components are considered a potential problem due to snagging or

Headband radio system can be fitted to different helmet types



Duplex radio module contained within helmet

disconnection, and consequently a fully integrated helmet communications system is preferred.

The Enhanced Helmet Communication Operations (ECHO) helmet manufactured by Helmet Integrated Systems Ltd is an example of the capability to combine a hands-free, cordless radio communication system into a fire fighters helmet, providing operational control features that enhance both the performance and safety of the fire fighting team.

Originally developed for the UK Royal Navy, and now in use on all RN surface ships and submarines, the ECHO integrates a fireman's helmet with a two-way duplex UHF radio system that offers effective multi-way communications between individual members of the fire fighting teams, and the forward damage control position.

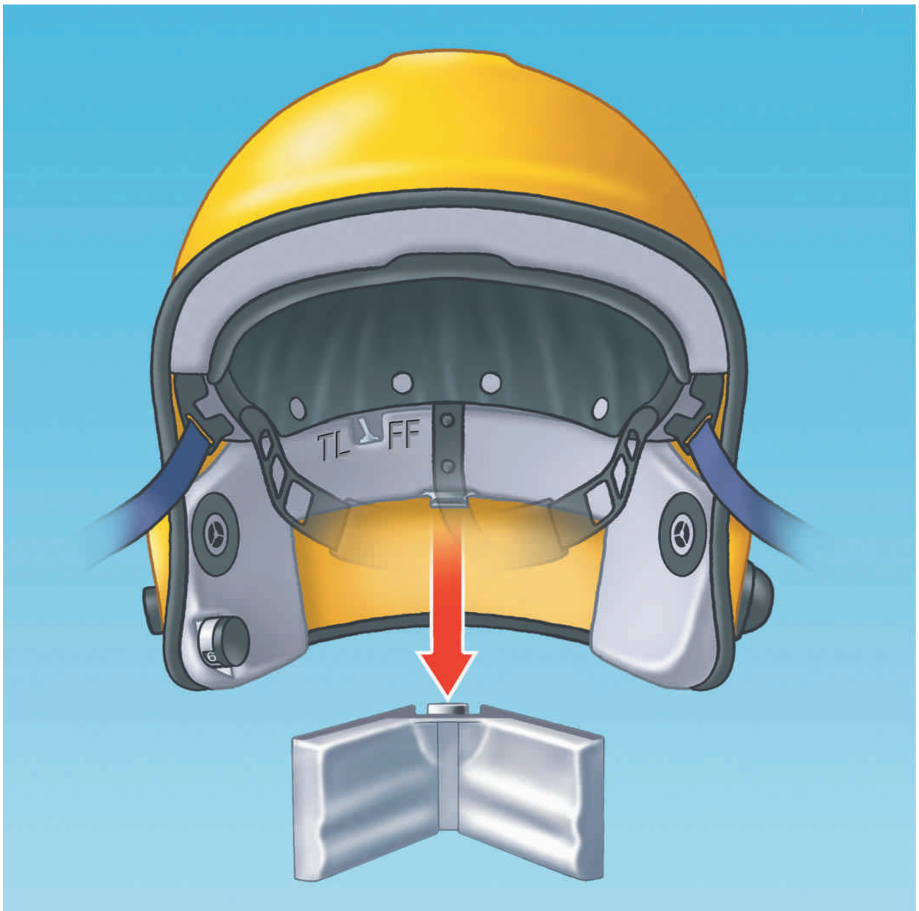
With conventional radios it is impossible to receive when transmitting or vice versa, and it is also very difficult to hear clearly in high noise areas. Although the ECHO has a line of sight range of 1.5 miles, the test parameter for use onboard ships was the capability of this radio to transmit clearly between three decks and five bulkheads This capability can be equally applied to non-marine uses where clear transmission between surface and underground locations is a necessity.

The duplex radio capability of the ECHO design, which is intrinsically safe certificated to Eex ib IIC T4, makes use of two transducer modules to produce a priority override facility. This is activated through the helmet, which incorporates a toggle switch enabling the radio to be set to either 'Team Leader' (TL) or 'Fire Fighter' (FF) mode, prior to entering the area of operations. Consequently all transmissions are overridden by those made from a helmet set to TL mode, enabling the designated team leader to pass instructions to all other members of the fire fighting team with radios set at FF mode, and to the forward control/ command position.

The override feature operates by establishing a higher transmission frequency *TXB* for the helmet set to TL mode, but continues to receive on the lower frequency *RXA* applicable to the FF mode.

Helmets set to FF mode, receive and transmit through one transceiver module, on the lower frequency *RXA* (receive) and *TXA* (transmit), but will also receive the higher transmission frequency *RXB*, on the second transceiver. Any transmission received on *RXB* will automatically switch off all *TXA* transmissions, enabling the Team Leader to be immediately heard.

The radio is constructed in modular two-part form, with earphone transducers fitted to the inside left and right sides of the helmet shell. These trans-



Integral battery provides up to four hours duration ducers have a tailored frequency response for maximum intelligibility, and are fitted with padded, passive noise-attenuating ear cushions that optimise wearer comfort and the clarity of voice reception in adverse conditions. An integral battery within the helmet powers the radio and is easily removed for re-charging, providing up to 4 hours operation depending on duty cycle.

By using a bone conducting microphone, located within the crown of the helmet, and enclosed in a noise isolation mounting, the transmissions are effectively isolated from high ambient noise, and from the inhale/exhale noise of the demand valve, when wearing breathing apparatus. The integral shielded radio antenna is also located within the crown of the helmet.

It is a key requirement that the bone-conducting microphone should still continue to provide good transmission contact even when the helmet is used with a facemask and anti-flash hood giving two additional layers of contact between the microphone and the wearer's head.

A large push to talk (PTT) switch is fitted to the side of the helmet, and can be easily operated by a gloved hand. Importantly, the PTT, which has a 'time out' feature to prevent over-extended transmission times, can be depressed through the faceshield or hood of a coverall gas tight suit. An on/off volume switch is fitted to the outside of the helmet, which also incorporates a rotary switch, to give a choice of up to 16 frequencies with 12.5 kHz spacing for multi-channel operations.

Helmet incorporates bone microphone, antenna and push to talk (PTT)

Headband radio system with push to talk unit

A hand-held version of the helmet radio is provided for use by the control/command centre, and this duplicates all of the functions of the helmet unit. Under normal circumstances the handheld radio would be set in FF mode, however this can be quickly changed to TL override, should it be necessary for evacuation procedures to be initiated.

Communications capability can also be added to existing fire and rescue helmets by fitting a universal headset communications system which interfaces an existing hand-held radio to the helmet, offering a choice of either bone conducting or boom microphones.

The Signum adjustable headset, which incorporates the microphone and receiver, can be attached to the headband of the helmet, positioning the bone microphone to the crown of the head, and the receiver to either the left or right ear as required.

The headset is connected in turn to the PTT switch, ending in an extending down lead with connector appropriate for the make and model of radio being used. The headset can generally be configured to existing PTT switches providing that they are also intrinsically safe.

Transmission and reception clarity will be influenced by the performance of the radio used; however the use of the bone microphone within the helmet enhances the transmission, and minimises the effect of ambient noise.

The use of the PTT enables the wearer to easily activate transmission with a gloved hand or elbow or in some circumstances if necessary by contact with part of the structure being negotiated.

Other systems available utilise either voice activated (VOX) or earpiece microphones.

Regardless of the radio type or interface with the wearer's other protective equipment, the potential user has the opportunity to trial alternative systems, and establish the best combination for the 'worst case' operational conditions likely to be encountered. In each case choice and availability of operating frequencies, protection from environmental factors such as heat, water, dust and intrinsic safety considerations will shape the type of system to be required.

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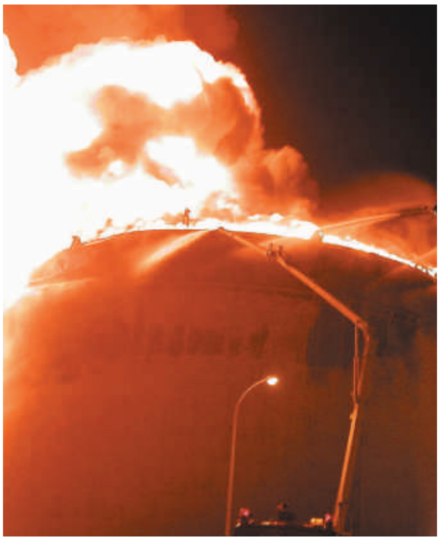
3M™ has a long history of innovation, in fact over 100 years! And 3M Australia Pty Ltd is no exception to that, being the first subsidiary outside the head office of 3M USA to be established in the early 1950s there has always an expectation for something "better" to come from a mature subsidiary like 3M Australia Pty Ltd. In 1993 Ted Schaefer – Foam Development Chemist completed a project he had started while at 3M Canada a few years before – it was 3M™ Fire-Brake™ BFFF (Bush Fire Fighting Foam). The years of product development paid off when it helped to save many lives and property during the 1993/1994 Sydney Summer Bushfire season. In fact Fire-Brake™ was so well received by industry and the fire-fighters of Australia that it was recognised as one of the "Top 100 Australian Innovations of the Century" because it stretched the effectiveness of bushfire tankers by up to five times when added at as little as 1 part per 99 parts of water. Ted's efforts have been recognised with many 3M Global Awards and Patents and his many years of extensive knowledge in this field have made him a leading industry expert both within Australia and around the world.

Pic courtesy of 3M


Pic courtesy of Alert Disaster Control

As a continued service to the industry and added safety feature, 3M Australia along with distribution partners have initiated an "Emergency Stock Program". This is a system whereby dedicated 3M resources are available 24 hours a day on stand-by to ship appropriate types of 3M Foam, 3M Respiratory and 3M Sorbent Materials from Key Strategic Stock Piles around the country to assist if local stocks are not sufficient or appropriate to cope with the emergency.

The last 50 years have certainly been innovative and helped 3M become the "Foam Experts" but not resting on our laurels 3M are constantly looking towards the future. Ted and the team are hard at work developing new environmentally friendly biodegradable foams for all types of flammable liquid fires and ever trying to be one step ahead of industry needs, the safety of the fire fighter and the new demanding legislations to protect our environment.

Pic courtesy of Alert Disaster Control

For more information,
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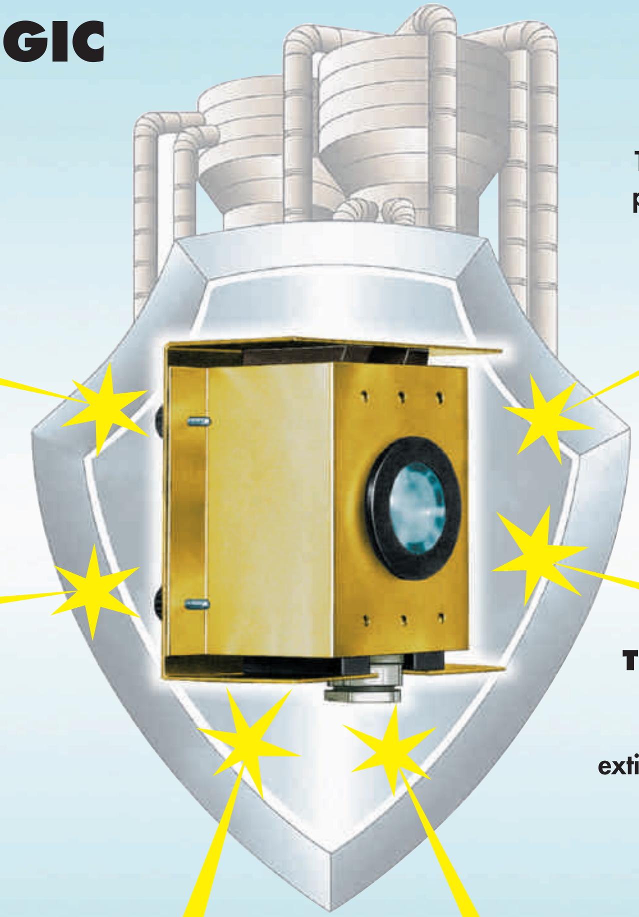

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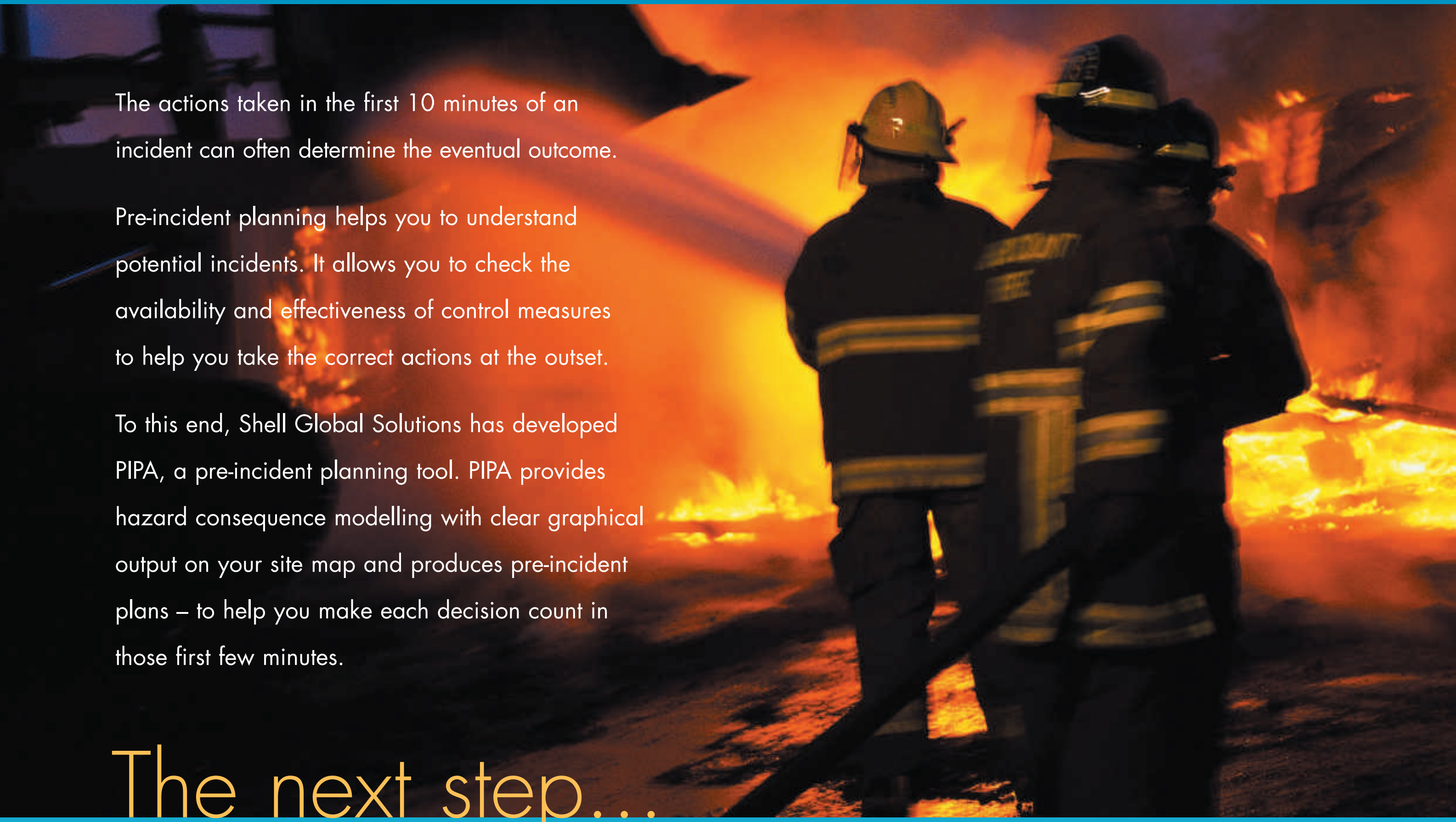
Make those first few minutes count



The actions taken in the first 10 minutes of an incident can often determine the eventual outcome.

Pre-incident planning helps you to understand potential incidents. It allows you to check the availability and effectiveness of control measures to help you take the correct actions at the outset.

To this end, Shell Global Solutions has developed PIPA, a pre-incident planning tool. PIPA provides hazard consequence modelling with clear graphical output on your site map and produces pre-incident plans – to help you make each decision count in those first few minutes.

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Protective clothing

by Rainer Steffens

Just wearing it is no guarantee of protection!

PROTECTIVE CLOTHING IS INTENDED to protect against contamination, in other words the contact with harmful substances. However, just wearing it is no guarantee of protection. A chemical-proof protective suit must be properly selected, it must be put on and removed in the right way and certain rules have to be followed while wearing it.

SELECTING A PROTECTIVE SUIT

Selection of the correct protective suit is based on the criteria contained in the European guidelines. These can be found in the instructions for the use of personal protective clothing (PSA-BV).

Every selection begins with a risk analysis. This includes a precise definition of the chemicals, their properties and toxicity and also the exposure conditions.[1] The risk analysis should also include an inspection of the workplace. The protective suit can then be selected on the basis of the data obtained. The more detailed the risk analysis, the greater the precision in deciding which protective suit is to be used.

A decision as to which protective suit to use is based on the following criteria, amongst other things:

- barriers
- physical properties, such as resistance to tearing and abrasion
- quality
- how comfortable it is to wear
- disposal
- price/performance ratio.

It is recommended that the specified protective suit, in addition to any other selected protective equipment in the operating instructions, is adhered to and that these are made available in the workplace for the employees.

CHOOSING A SIZE

Choosing the correct size is a prerequisite not just for greater safety, but also for greater comfort.

Suit sizes are decided on in accordance with the EN340 standard. In order to select the right size, the wearer of the protective suit must give his or her height and chest measurement. Measurements are without shoes and with one layer of underwear. On the basis of these measurements, the suit size is defined in accordance with the sizes given by the manufacturer in the instructions for use. It is important however to check the manufacturer's actual sizes as shown on labels inside

It is recommended that the specified protective suit, in addition to any other selected protective equipment in the operating instructions, is adhered to and that these are made available in the workplace for the employees.

Protective clothing

the suits, since the size designations S, M, L, XL, XXL, etc. can vary from one manufacturer to another.

Choosing the wrong size can have fatal consequences.

If the chest is measured whilst wearing work clothes or if height is measured whilst wearing shoes, then the suit will be too big. As a consequence the suit will get caught or get stuck in production machinery.

Choosing a protective suit that is too small, on the other hand, can result in tearing or considerably restricted mobility.

There are, however, a number of other serious mistakes that can be made even before putting a suit on. For example, if a package is opened with a knife or some other sharp object, a suit can be damaged without this being noticed.

The size and type of a suit should be checked once again before putting it on, for example by checking the information on the suit packaging or on the label inside the protective suit. The protective suit must in any case be checked for any material and manufacturing faults. It should also be checked that the zip works properly.

PUTTING ON THE PROTECTIVE SUIT

It is important that you do not get changed at the workplace, as this could have been contaminated as a result of previous work. A place should be selected for getting changed that is absolutely free of any contamination.

Safety shoes and boots must be put on before the suit. All objects that could obstruct work are removed from jacket and trouser pockets. A light lining makes it easier to put the suit on.

The following should be observed when putting the suit on:

- Due to its high level of air-tightness and the required earthing, the suit is worn over the shoes or boots.
- For an increased level of protection and in order to prevent any risk of contamination when removing the suit, it is recommended that double gloves are worn. Nitrile gloves, for example, could be used as the inner layer of gloves. These gloves are worn under the suit, and the outer layer of gloves is worn over the suit. It is recommended that where the outer gloves meet the sleeves of the suit, this is sealed with adhesive tape.
- If, on the other hand, only one pair of gloves is worn, these are worn under the suit and the gap where the two join is sealed with adhesive tape.
- The zip cover should be closed; in many cases it is recommended that the zip cover is also sealed using adhesive tape.
- If a breathing mask is used, the hood of the protective suit is worn over the mask. In many cases it is worth recommending that the hood is attached to the mask; this should be done by using several small pieces of adhesive tape in order to prevent creases (see also “Tips for sealing protective suits”).
- In order to ensure that the critical points of the suit are sealed as well as possible, a colleague should help with this.

REMOVING THE PROTECTIVE SUIT

The protective suit should be removed in a contamination-free space. In general it should be removed only with the assistance of an ancillary staff member wearing personal protective equipment that is appropriate for the hazardous substance. Before taking off the protective clothing, it is advisable to clean the gloves and boots first in order to

Pic courtesy of DuPont

prevent dust being thrown up. Masks and zip covers are wiped down with a cloth – having first been moistened with a water spray if necessary.

In order to avoid contamination when removing the suit, special attention must be paid to a number of points:

- If breathing protection is used with the protective suit, this must be worn until the rest of the clothing has been removed.
- Any adhesive tape used for sealing the suit is removed carefully.
- Afterwards, when removing the outer gloves, it must be ensured that the inner gloves do not come into contact with the outside of the outer gloves; the outer gloves should therefore only ever be gripped by the inner surface, and never by the outside contaminated surfaces.
- If only one pair of gloves is used, these must be cleaned thoroughly and kept on until the rest of the clothing has been removed.
- When removing the suit, it is important to start with the hood, carefully using your thumbs and index fingers to turn it back and outwards. The suit can then be turned inside out, pulling it over the shoulders and slipping it off over the boots.
- During the entire removal of the suit, the contaminated outer surfaces of the suit and gloves must not come into contact with the skin at any time.

Any removed protective items, such as adhesive tape, should be immediately disposed of in a chemical waste container provided for this purpose. When discarding the protective suit, it should be made certain that it is only held by the non-contaminated inner surface in order to prevent contact with the hazardous substance. The process of removing the suit results in contamination of the workplace, which must then be cleaned.

IN THE EVENT OF NON-OBSERVANCE

Failure to put on and take off protective suits properly can result in skin or underclothing coming into contact with hazardous substances, in other words the wearer becomes contaminated, although the protective suit itself provides optimal protection against the substances that are hazardous to health and which occur in the workplace (dust, liquids, etc.).

Common mistakes and their consequences are:

- Missing or incorrectly applied sealing between sleeves and gloves can result in exposure of the arms when carrying out overhead operations.
- If the gloves and the zip cover are not stuck down properly they will not be airtight and the hazardous substance can get onto the arms or the underwear.
- Putting the suit on whilst wearing safety shoes or boots often causes damage to the protective suit.
- If the protective suit is worn tucked into the boots rather than over them, the hazardous substance can easily get into the boots. In addition the electrostatic charge cannot be conducted away, as there is no contact between the suit and the boots.

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- Improper taping of the mask can lead to loss of air-tightness and restricted vision.
- Removing the suit too quickly or in the wrong order can result in contamination from head to foot.
- Leaving a used protective suit can cause contamination of the working environment and of your colleagues.

Obviously you must not leave the danger zone in a contaminated state. It is even more important that there is no great likelihood of skin or underwear contamination being carried over through an oversight into normal, non-protected everyday environments (so-called cross contamination). This poses a risk not only to the wearer of the protective suit, but also to others who are not involved in the procedure, such as family members!

TRAINING MUST BE GIVEN IN CORRECT CONDUCT!

The following important recommendations can be given as the "essential features":

- Protective suits must be available at all times in the necessary sizes and in sufficient numbers!
- Employees must be given the opportunity to take their size measurements precisely in order to work out their correct suit size.
- The type of protective suit must be decided on based on the conditions of use (risk analysis) and this should be stipulated as part of the operating instructions.
- Each employee concerned must be sufficiently trained so as to be able to verify the type and size of the protective suit to be used.
- Training must be given in the correct way of putting on and removing suits – even limited-use chemical protective clothing! The regulations must be stated in an appropriate document.
- Protective suits must always be put on and taken off with the assistance of a helper, as only this person can check that all the protective parts are sitting correctly and whether there are any non-airtight areas (when taping up).
- Suits must be put on and taken off calmly and without any rush and in accordance with known and practiced regulations relating to sequence.

TIPS FOR SEALING PROTECTIVE SUITS

Where adhesive tape is used to provide additional sealing on protective suits, this should always be done with a helper.

When using adhesive tape to seal a suit, e.g. on the zip cover, make sure that there are no folds, as the hazardous substance could easily collect here.

To facilitate removal of the adhesive tape when taking the suit off, it is best to put a loop in the tape.

LITERATURE

1. "Chemical protective suits" (brochures), DuPont Luxembourg, 2001
2. "Correct use of protective clothing" (Video/CD), DuPont Luxembourg, 2002

Rainer Steffens has a chemist background. He has been with DuPont Personal Protection for 15 years, working on technical and marketing projects related to protective garments against chemical risks. Rainer now leads DuPont Personal Protection's chemical protective clothing product range development.

Automatic Fire Vents
Protect Property and Aid Fire fighters

Bilco automatic fire vents allow smoke, heat and gases to escape from a burning building. Fire venting helps to prevent structural damage to the building and aids fire fighters in their containment efforts. Fire Vents are ideally suited for structures with large areas of unobstructed space such as factories, warehouses, auditoriums, and retail facilities.

Bilco Automatic Fire Vents:
- Open automatically upon the melting of a 74°C (165°F) fusible link
- Include interior and exterior pull cables for manual operation
- Feature gasketing and fully insulated covers and curb for energy efficiency and weathertightness
- Can be safely and easily reset from the roof level
- Are available in a number of UL-listed and FM-approved sizes

ISO 9001 CERTIFIED

Bilco®
Building on Our Tradition™

For more information please contact:
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P.O. Box 1203 • New Haven, CT 06505, U.S.A.
+1 (203) 934-6363 • Fax: +1 (203) 933-8478
E-Mail: export@bilco.com • Website: www.bilco.com

SHELL PRE-INCIDENT PLANNING ASSESSMENT TOOL (PIPA)

Shell Global Solutions

Although every effort can be made to prevent incidents such as fires occurring, the possibility can never totally be removed. The actions taken in the first 10 minutes of an incident play a key part in how the overall incident is managed and controlled, and often determine the potential for escalation to other parts of the asset.

The appropriate use of pre-incident planning can assist in identifying the correct course of action and therefore reduce the potential impact of an event.

Shell Global Solutions has worked with the Royal Dutch/Shell Group over a number of years to devise a pre-incident planning methodology. This consists of a number of steps to be considered when preparing a plan. These include:

- identifying the event or scenario (it is important when developing pre-incident plans to only consider credible scenarios)
- assessing how quickly the scenario can be detected
- determining the fuel supply reduction measures
- quantifying the consequences
- prioritising the protection measures, etc.

Our experience shows that effective pre-incident planning can only be achieved with the inclusion of personnel familiar with the operation of the process as well as the emergency services. This helps to ensure that the correct actions are taken from the outset as during a real incident every minute counts.

Further, when applied at the design stage, the pre-incident planning methodology can be a powerful aid in developing cost-effective fire protection strategies.

A good pre-incident plan will consider all of the above steps and help the operator to take the correct actions during those important first few minutes.

Tools for developing pre-incident plans

Shell Global Solutions has developed PIPA, a software tool to assist in this process.

PIPA has been designed to provide plant operators, safety engineers and the emergency services with hazard consequence information that can be used directly in the development of emergency response plans and the specification of fire protection measures. Throughout the development of this software tool, Shell Global Solutions has drawn on the wealth of operator experience from the Royal Dutch/Shell Group, arguably one of the world's most experienced organisations in the fields of safety, and hazard and risk assessment.

The software uses hazard consequence models taken from its sister package, Shell FRED, which have been validated against data from extensive experimental research. These models can be used to quickly determine and visualise the extent of a potential hazard with results displayed directly on a site plan.

After assessing the consequence, PIPA guides the user through each of the steps in the process. In this way the tool helps the first-line intervention team to devise the most effective pre-incident plans in order to help prevent escalation. This will help you to protect your staff, the public, the environment and your assets.

PIPA can be used for existing plants and new facilities. It produces clearly understood, asset-specific, pre-incident plans. By allowing users to produce comprehensive reports in their native language it ensures that they are full understood by everyone involved. These pre-incident plans can be quickly updated and are fully web-enabled allowing for ready communication with all parties.

PIPA has been developed with simplicity and ease of use foremost in mind. It has been designed to be used by your existing personnel and not restricted to specialists in hazard and risk analysis.

To assist users in getting the maximum benefit from PIPA, and the underlying principles of effective pre-incident planning, Shell Global Solutions also provides full software and pre-incident planning training. The course has now evolved into a two-day, in-depth workshop that combines practical experience with theoretical knowledge.

For further information, or to receive a free demo CD, please contact:

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Website: www.ShellPipa.Com

SPREADERS

NEW AMK-24 SPREADER FROM AMKUS

AMKUS AMK-24 spreader

The NEW **AMKUS Rescue Systems** model AMK-24 spreader is a remarkably compact (under 30 inches in length) and lightweight (just 37.35 lbs., ready to use) high performance rescue tool.

Its small footprint creates more free space in the truck without sacrificing power at the scene! The AMK-24 features innovative push button pins for easy tip removal, which ELIMINATES THE POSSIBILITY OF LOSING PINS IN THE FIELD! The intelligent valve placement and ergonomic handle design create excellent balance, simplifying positioning and operation.

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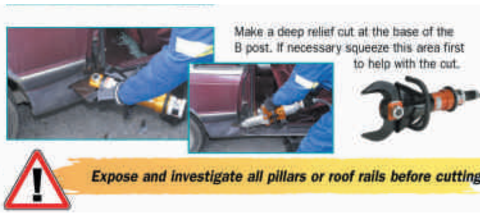
SPREADER RANGE HOLMATRO RESCUE EQUIPMENT

As the world's largest manufacturer of hydraulic rescue equipment **Holmatro** offers many different spreader models for a wide variety of applications, from Road Traffic Accidents (RTA) to Urban Search and Rescue (USAR) and any other application that requires a spreading, pulling or squeezing action. The choice of the rescuer for a certain model very much depends on his requirements and the particular applications he sees himself faced with most often. Holmatro® spreaders can be categorised as follows:

- For spreading operations with a very limited initial insertion gap: model PW 3624 (Holmatro® Wedge Jack). Special features of this model include:
  - Requires an insertion height of only 6 mm. It can create an initial opening where other tools can't.
  - Maximum lifting height is 50 mm. This is enough for other tools to take over.
  - It combines this very small insertion height with a spreading force of 24 tonnes.

These characteristics make the Holmatro® PW 3624 an essential tool in specific rescue operations. Think of certain USAR applications, opening roller shutters, etc. The PW 3624 often complements a rescue system and is used in addition to the models mentioned below.


Make a deep relief cut at the base of the B post. If necessary squeeze this area first to help with the cut.
Expose and investigate all pillars or roof rails before cutting

Holmatro® PW 3624

- For 'regular' RTA applications and other medium-duty spreading operations: Holmatro® spreader models SP 3230+ and SP 3240+. Special features of these models include:
  - Can be used for spreading, pulling, squeezing and cutting (with cutting tips).
  - Well-serrated tips for perfect grip during spreading and squeezing.
  - Quickly interchangeable tips and accessories.
  - Pulling accessories without protruding parts.
  - Arm, yoke and tip design for easy penetration in confined spaces.
  - Ergonomic design: handle with perfect grip, well-balanced tool, safe and user-friendly proportional deadman's handle.

Holmatro® SP 3240+

- For heavy RTA applications, heavy USAR applications and any other heavy spreading action: Holmatro® spreader models SP 3260+ and SP 3280+. Special features of these models include all of the features mentioned for models SP 3230+ and SP 3240+.

Holmatro® SP 3280+

SHOWCASE

The Holmatro® SP 3280+ offers a maximum spreading force in excess of 26 tonnes and a minimum spreading force according to the prEN 13204 norm of no less than 8.8 tonnes!

For further information, please contact:
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HURST SPREADERS

Spread, pull and lift with maximum force and efficiency. **HURST** Jaws of Life® spreaders work efficiently and are both easy to handle and extremely versatile. With these lightweight tools you can easily move metal, masonry, timber, and many other materials.

Features:

- Lightweight and effective
- Can be used for spreading, pulling and lifting
- "Deadman" control valve
- Spring guarded pigtail hose
- Operates from all Hurst power units
- Vast selection of useful accessories

Hurst Jaws of Life spreader

Transformer Armset	**24 in**	**32 in**	**40 in**
Spreading force (at tips)	37,500 lbs (167 kN)	31,000 lbs (138 kN)	18,900 lbs (84 kN)
Pulling force (at shackle holes)	21,300 lbs (95 kN)	16,500 lbs (73 kN)	12,100 lbs (54 kN)
Opening distance	24 in (610 mm)	32 in (819 mm)	40 in (1036 mm)
Weight (w/fluid & connectors)	55 lbs (25 kg)	59 lbs (27 kg)	62 lbs (28 kg)
Length	24 in (610 mm)	27.50 in (699 mm)	33.25 in (845 mm)
Width	15½ in (394 mm)	15½ in (394 mm)	15½ in (394 mm)
Depth	8¼ in (210 mm)	8¼ in (210 mm)	8¼ in (210 mm)

Transformer

The Transformer is a breakthrough in spreader versatility. The tool is equipped with easily interchangeable spreader arms to allow for either maximum spreading power or extreme spreading widths. The tool is easy to operate and features arms that can be quickly and easily interchanged at the site of the accident without requiring additional tools.

Hurst Transformer

In addition to the basic version with 24 in (610 mm) spreader arms, an arm set with spreading distances of 32 in (819 mm) and 40 in (1036 mm) is also available.

ML-32

This universal tool is perfect for all rescue operations after traffic accidents and many other situations. It provides a spreading distance of 32 in (812 mm) and a pulling distance of 27 in (690 mm). A variety of spreader tips for specific needs that can be easily interchanged are available for the ML–32 (see accessories).

Hurst ML-32

ML-32

Spreading force (at tips)	16,000 lbs (71 kN)
Pulling force (at shackle holes)	14,400 lbs (64 kN)
Opening distance	32 in (819 mm)
Weight	52 lbs (23.6 kg)
Length	27.3 in (693 mm)
Width	14 in (356 mm)
Depth	8.3 in (211 mm)

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Email: rleonard@haleproducts.com
Website: www.jawsoflife.com

LUKAS® LSP 30 T TELESCOPIC-SPREADER

The new **LUKAS** telescopic spreader – superior technology for the challenges of tomorrow. The mobile spreader with telescopic arms is offering two features at a time: extremely high spreading force and extremely wide spreading distance. And that's new compared with traditional spreader designs: depending on the rescue situation it is up to the operator to switch either to "maximum force" or to "maximum spreading".

Lukas telescopic spreader

Recommended applications:

- Rescue operations in traffic accidents
- Rescue operations in buildings or after natural disasters
- Mobile rescue after a building collapse
- Confined space rescue e.g. in tunnels

Highlights:

- innovative telescopic technology for maximum mobility and multifunction
- spreading force and spreading distance can be chosen according to the specific rescue scenario
- easy adjustment of the arm length
- low oil consumption – ideal for the combination with a mobile hydraulic pump (e.g. LUKAS CP 100)
- only minimum storage space required
- maximum handling comfort through low weight, compact design and perfect balance for precise operation with your fingertip in any working position

LUKAS Hydraulic Pumps are set to a system pressure of 630 bar. Acc. to DIN and prEN standard the working pressure can be increased at 10%. If the tools are operated with the increased working pressure (693 bar), also the tool forces would increase by 10%.

LUKAS® LSP 40 EN SPREADER

The new LUKAS universal spreader for all rescue units. The strongest and lightest tool in its class. With patented multi-function tips for four types of application: spreading, peeling, pulling and squeezing.

Highlights:

- Spreading distance 720 mm makes man-holes inone step
- Precise operation with your fingertips in anyposition
- Limited angle of spreader arm opening for safeoperation
- Fast opening and closing speeds up the rescue
- Operator safety features – all moving mechanicalparts are covered
- Tool fully balanced

Lukas universal spreader

Recommended applications:

- Especially suitable for rescue in traffic accidents and accidents in buildings
- Moving and lifting of obstacles
- Opening doors and deforming of metal structures
- Making man-holes in metal walls
- Pulling obstacles out of the way
- Closing pipes
- Spreading and peeling without changing of tips
- Pulling with LUKAS Quick-adjust chain set (accessories)
- Closing pipes with LUKAS Squeezing attachment (accessories)

Useful Accessories:

Chain Set KSV 11 Weight 29.3 lbs/ 13.3 kg
Quick-adjust Chain Set KSS 20 Weight 28.7 lbs/13.0 kg
Spreader Tip Weight 2.4 lbs/1.1 kg
Squeezing Attachment Weight 2.6 lbs/ 1.2 kg

LUKAS Hydraulic Pumps are set to a system pressure of 630 bar. Acc. to DIN and prEN standard the working pressure can be increased at 10%. If the tools are operated with the increased working pressure (693 bar), also the tool forces would increase by 10%.

LUKAS® LSP 60 EN SPREADER

High-Performance-Spreader with enormous forces

Worldwide proven design for heavy-duty rescue jobs. One of the strongest tools in its class. With patented multi-

Lukas LSP 60 EN Spreader

function tips for spreading, peeling and pulling.

Highlights:

- Opening of steel walls up to 0.16 in/4 mm (thick)
- Peels man-holes up to 31.5 in/ 800 mm with one single stroke
- Precise operation with your fingertips in any position
- Spreading and peeling without changing of tips
- Operator safety features
- all moving mechanical parts are covered

Recommended applications:

- Moving and lifting of obstacles
- Opening doors and deforming of metal structures
- Making man-holes in metal walls
- Pulling obstacles out of the way with chain sets
- Railroad, aircraft and naval accidents, natural disasters
- Tool fully balanced
- Fast opening and closing speeds up the rescue
- Limited angle of spreader arm opening for safe operation

Useful Accessories:

Chain Set KSV 11 Weight 29.3 lbs/ 13.3 kg
Quick-adjust Chain Set KSS 20 Weight 28.6 lbs/13.0 kg
Spreader Tip Weight 2.4 lbs/1.1 kg

LUKAS Hydraulic Pumps are set to a system pressure of 630 bar. Acc. to DIN and prEN standard the working pressure can be increased at 10%. If the tools are operated with the increased working pressure (693 bar), also the tool forces would increase by 10%.

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NIKE HYDRAULICS

Hydraulic Spreader DHS50-720

The new hydraulic spreader DHS50-720 from NIKE HYDRAULICS has been designed for one purpose: to provide you with a tool that will never let you down. NIKE HYDRAULICS hydraulic spreader DHS50-720 has all the major characteristics that you expect from a high quality, professional rescue tool:

Double Power and Double Spreading – LUKAS Telescopic Ram LTR 12

The sum of all advantages: Unsurpassed performance

- ✓ *Double power – 24 t in the first stage*
- ✓ *Double spreading – two pistons at a time (1505 mm total lenght)*
- ✓ *Only one ram can do the job of two standard rams*
- ✓ *Compact lightmetal design saves weight and storage space*

With the innovative LUKAS solutions you are excellently pepared for the challenges of the future.

LUKAS Hydraulik GmbH
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Fax +49 (0) 91 31/69 83 94
Internet: www.lukas.de
e-mail: info@lukas.de

compact design, large opening and, maybe most important, absolute convincing spreading, squeezing and pulling performance. Besides all that, the hydraulic spreader weights 20 kg only.

Nike Hydraulic Spreader DHS50-720

The hydraulic spreader is one of the most commonly used rescue tools when it comes to free victims from crashed vehicles. Therefore, a hydraulic spreader must be capable to deal with the most varying rescue task you may encounter. NIKE's DHS50-720 has been developed to meet these challenges. The DHS50-720 with its 720 mm opening (123 degrees) has a maximal spreading force of 26.5t, a max squeezing force at 8t and max pulling force at 6.4t. In other words, the DHS50-720 has characteristics that will meet your demands for the most challenging rescue situations.

In order to enlarge the tools capabilities, there are several accessories available. Thanks to the quick-lock-system, the spreader tips can easily be removed and replaced with for example chain attachments, cutting tips etc.

Furthermore, there are several safety features such as a build-in safety valve to protect the tool from overload or clearly marked hoses in order to prevent any mix-up when connecting the tool to a pump.

All technical specifications of the new hydraulic spreader DHS50-720 from NIKE HYDRAULICS are, of course, is accordance with prEN13204.

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Website: www.nikehydraulics.com

TNT RESCUE SYSTEMS, INC.

When you are called into action, the victims trust that you are the best. You need the same kind of trust in your extrication tools. At **TNT**, we are dedicated to manufacturing the highest quality extrication equipment in the industry. TNT not only provides the right type of equipment for your department, but we back it up. At TNT, customer service is more than just a phrase – it's a way of life. We are dedicated to our distributors, and in turn their customers, in a way that is second to none. This dedication is shown by every representative and every employee of TNT Rescue Systems, Inc. TNT continues to lead the way with outstanding customer service and a lifetime warranty, and will continue to meet the demands of rescue workers around the world by providing ground breaking technological innovation in the rescue tool marketplace.

TNT Rescue Systems Spreaders

TNT's current product lineup features Rams, Cutters, Combi Tools, Pumps, Lifting Bags and Spreaders. TNT Spreaders combine grabber jaw and automotive spreader tips made of heat-treated tool steel, which enables better tool grip and relocation of metal. Their variable speed dead man control gives the operator more flexibility in critical situations. The spreaders are also well balanced for easy positioning and D-shape wrap around handle ensures easy operation in all positions for left or right-handed operators. TNT spreaders also come equipped with dual pilot check valves for reliable and superior load holding, plus their wear resistant anodized surface protects them from corrosion that would shorten the life of the tool. And, as all TNT products do, spreaders come with TNT's standard lifetime warranty and guaranteed 24-hour customer service.

TNT's Spreaders have a maximum working PSI of 10,500. With a 24″ – 41″ range of maximum operating at tips, TNT's four Spreader models, the S-100-24, S-100-28, S-100-32 and S-100-41, offer you selection based on your departments individual needs.

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WEBER-HYDRAULIK KEEP THE "PRESSURE ON" WITH NEW HIGH PERFORMANCE TOOLS

With more than 65 years' experience in the field of high pressure hydraulics and 30 years experience in the field of hydraulic rescue tools, **WEBER-HYDRAULIK** now introduces the most powerful 32″ spreader in the world!

The SP 60 – a powerhouse with more than 25 tons maximum spreading force!

Using the latest technology available in R & D, combined with lightweight and high-strength materials also used in spacecraft technology, it has been possible to produce a heavy-duty spreader weighing less than 25 kg!

The slim design of the SP 60 is a one-man operated tool with the unique, fine-tuned WEBER push button control system.

The most important fact is the impressive high starting force at the closed tips of 6.9 tons – unrivalled in the class of 32″ spreaders!!

Due to these high spreading forces, new tips were designed to help the user get the most power onto the object at almost any position of the spreader arms: the slim design of the front end of the tips means easy access to con-

Weber-Hydraulik SP 60

fined spaces, distinctive serrations over all the length of the tips “bite” into any opening position of the arms – opposite serrations at the end of the tips grip the object at opening angles of the arms at more than 90°.

The inside of the tips are serrated as well for perfect grip during squeezing. And that’s not all: the new tips incorporate a peeling section – so cutting of sheet metals is also possible with this universal new tip design!

Pulling chains with the well-known WEBER chain quick lock system extend the range of applications. Max. pulling force is more than 7 tons at a pulling way of 27″.

Pigtail hoses with a 4:1 safety ratio, built-in double check valves, a unique full protection against overload by integrated pressure relief valves, two non-slip carrying handles (one of them collapsible), anodised aluminium parts, etc. can all be taken for granted with WEBER equipment.

This equipment is already third-party tested according to German DIN 14751, US NFPA 1936 and future European Standard prEN 13204. WEBER itself upgraded it’s own ISO 9001 certification to the 2000 revision early this year.

Leading fire brigades with a requirement for heavy duty life saving rescue equipment are keen on this new product!

And with continuous development of its complete range, WEBER continues to offer its partners the very best options available.

For more information, please contact:
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Website: www.weber.de

ZUMRO RESQ 65 SPREADER

Zumro ResQ, the Netherlands, continuously improves its line of hydraulic rescue tools in order to be able to rescue the victims in a safe way, even from the latest types of trucks.

Already being tested on a variety of new trucks, such as DAF and Volvo, the ResQ 65 spreader proves to be a very compact rescue tool and it has an excellent power to weight capacity. The ResQ 65 has a spreading capacity up to 28 tonnes at the base of the jaws.

ResQ 65 spreader

The ResQ 65 spreader is also equipped with the unique, *truly flat face connectors’*. These flat face connectors allow you to blindly connect the couplings without any hazard of getting sand or dirt into the connectors while connecting them to the rescue tools. Any possible sand or dirt can simply be removed by wiping it away by the hand.

In order to develop the best rescue solution, Zumro ResQ constantly listens to its customers. Due to this interaction Zumro stays ahead in the latest updates that are necessary to create the most reliable tools for the rescue services all over the world.

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Fax: +31 252 411794
E-mail: info@zumro.nl
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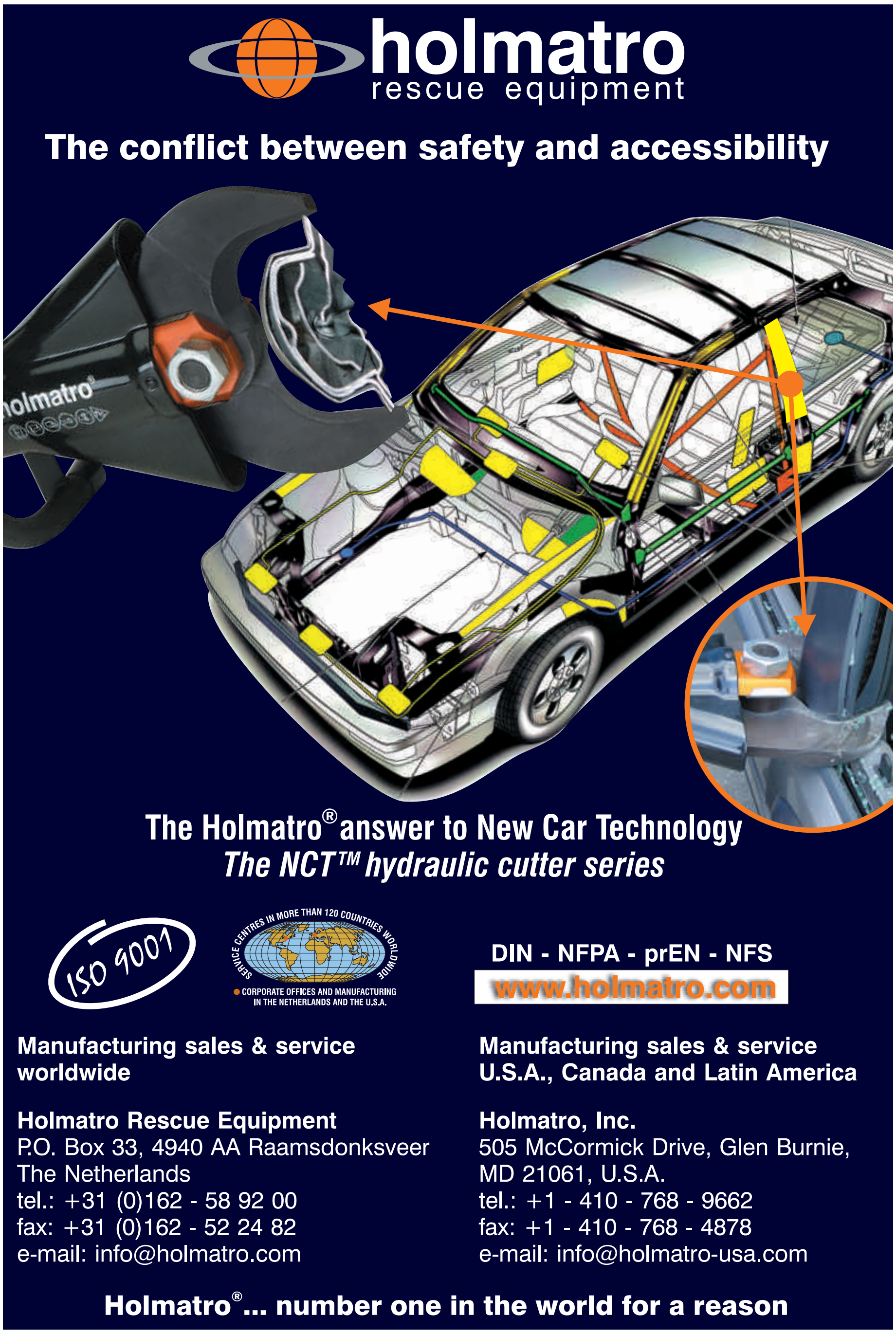

holmatro
rescue equipment

The conflict between safety and accessibility

The Holmatro® answer to New Car Technology
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fax: +1 - 410 - 768 - 4878
e-mail: info@holmatro-usa.com

Holmatro®... number one in the world for a reason

SOLOVISION

The world's first true hands-free thermal imaging camera just keeps getting better!

GB Solo Limited, of the United Kingdom, is Europe's leading innovator in the field of thermal imaging cameras and rescue helmets. With manufacturing and Head Office based in the U.K., GB Solo has established an Asia/Pacific Region office in Kuala Lumpur in order to better service the growing number of customers in the region. The company's core products are the Unifit integrated rescue helmet and SOLOtic, the world's only fully integrated thermal imaging rescue helmet.

The company launched the SOLOvision thermal imaging camera two years ago, and since its launch, SOLOvision has made a big impact on the fire and rescue marketplace – in particular in the South East Asian market. Recent converts to SOLOvision, from the traditional style TIC, include Royal Malaysian Navy; Korean Fire Service; Singapore Civil Defence Force; Shanghai, Beijing, and Nanjing Fire Departments as well as the Chinese Army.

Each of the Royal Malaysian Navy's 6 new MEKO Class Patrol Vessels (140 crew) will be equipped with 16 Unifit helmets and 3 SOLOvision FIRE cameras.

SOLOvision's unique ability to completely eliminate smoke interference with the user's view of the display, combined with its light weight, makes it the only thermal imaging camera that can offer the fire fighter a truly clear view of his environment while also giving him two hands free to perform his duties.

The SOLOvision is available as a camera for fire brigades operating on a budget

Ergonomic design allows for both hands-free and hand-held use

A number of helmet-mounted cameras are available in the market but, without exception, they offer a very small display, usually viewed through only one eye, and with the display mounted at least a couple of inches in front of the user's face-mask. This gives the fire fighter a very small view of the scene and also allows smoke to come between the front of the face-mask and the camera display. Another problem occurs if the fire fighter's helmet takes a knock and moves out of position – the fire fighter loses his thermal vision!

SOLOvision overcomes these deficiencies by sealing the twin-LCD display to the front of the fire fighter's face-mask by means of a high melting point rubber seal, thus ensuring no interference of the user's view of the display by smoke.

Secondly, the use of a (patent-applied for) 180,000 pixel twin-LCD Augmented Reality Viewing Optics (ARVO) system provides the user with a perceived 1m square image – almost as if he were looking at the scene with his own eyes. And, of course, being fixed to the face-mask means the SOLOvision display never moves from where it should be – in front of the fire fighter's eyes.

With on-screen battery status, and optional spot temperature measurement and colour display, the SOLOvision FIRE presents the fire fighter with an unrivalled, state-of-the-art rescue solution.

Towards the end of 2003, GB Solo introduced another variant of the SOLOvision concept – the SOLOvision SAR. The SOLOvision SAR (Search & Rescue) camera utilizes a longer range thermal sensor than the FIRE model. The FIRE is intended for close quarter fire-ground size-up and rescue, whereas the SAR camera is intended for rescue teams that need to be able to clearly detect a human form at distances up to 1 km.

This applies to jungle, mountain and woodland rescue, search & rescue at sea, whether from a boat or helicopter, and air crash victim detection.

The latest member of the SOLOvision family is the SOLOvision Hand-Held. Developed to go head-to-head with the traditional TIC, while retaining the benefits of the SOLOvision concept, this camera runs for up to 3 hours on just 6 AA batteries.

The SOLOvision Hand-Held has hand-straps to allow it to be held and viewed in one hand. It also weighs less than 850 gms in its operational state – and it is priced to be attractive to fire departments on a tight budget. Yet, this amazing little camera still offers full hands-free capability as well as total smoke elimination.

For more details on any of the GB Solo product range, please contact:

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1st Announcment

FDIC FESA

Fire & Emergency Services Asia 2005

Theme: The New Threat Environment: Protecting the Community
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Foams: PFOS update

PART I

By Mike Willson

FP70 Plus ideal for MTBE and unleaded gasoline hazards, now also with excellent Lastfire results

MANY FOAM USERS have been sitting tight since 3M suddenly announced their withdrawal from Fluorocarbon surfactant and fire fighting foam manufacture over 3 years ago due to environmental concerns about PFOS (PerFluroOctanyl Sulphonate), a breakdown product of their foams. Many are still wondering what they should do to be certain they select a supplier who has similar capabilities in terms of an extensive high performance product range, well tried and tested products, innovation that will support their needs into the future, technical product support that will answer technical and applications problems for them, detailed material safety information, foam testing facilities to check their foams are still in good condition, emergency foam stocks and an effective 24 hour, 365 days global emergency response service that has been proven to work, but has no PFOS present.

Many foam users now need to review their foam stocks and order new product from a different supplier. Carrying out a supplier audit to determine the manufacturer you wish to rely on and work with into the future is a more important decision even than choosing the right product. Once selected the manufacturer should work in partnership with you to assist with effective product selection to meet your needs, ensuring that the most appropriate product(s) are being used to meet all your flammable liquid hazards and foam applications on site. We'll come back to this, but meanwhile there have been important developments that will give all foam users the confidence to check out new suppliers, look for replacements of PFOS containing foams and verify whether the ones they are currently using are suitable for continued use into the future.

PFOS UPDATE

Most readers will know that PFOS was the persistent, bioaccumulative and toxic breakdown product and ingredient in some 3M fire fighting foams that caused them in May 2000 to announce their withdrawal from producing this range of fluorosurfactant chemicals (concluded in Dec 2002).

They used the ElectroChemical Fluorination (ECF) or Simon Cell method to produce their fluorochemicals and generate PFOS ($CnF_{2n}+1SO_3$ – M+, with M+ being any cationic counter-ion) and numerous derivitatives. The perfluoroctanyl (C_8) chemistry principally is now considered a Persistent, Bio-accumulative and Toxic (PBT) chemical. Other associated chemicals the PFOA (PerFluoro Octanoic Acids) group, are also under investigation by the Environmental Protection Agency (EPA) in USA as potentially harmful products.

TELOMERISATION

However the second major industrial process used to make fluorochemicals is Telomerisation, a process that was developed and is currently used by DuPont and others to synthesize fluorotelomer-based products. These fluorotelomer-based products contain neither PFOS nor any of its derivatives, and does not contain PFOA either. PFOS is neither manufactured nor is it a by-product of this fluorotelomer-based chemistry.

PFOA (perfluorooctanoic acid, $CnF_{2n}+1COO$ – M+, with M+ being any cationic counter-ion) is neither used as a raw material, nor an intermediate, nor is it added during the synthesis of fluorotelomer based surfactants, which are widely used in the firefighting foam industry. Most foam manufacturers use telomers – apart from 3M, their former local mixing plants around the world and a few other smaller foam producers and suppliers who used the 3M fluorosurfactants in their fire fighting foam products prior to Dec 2002.

and the way forward

ENVIRONMENTAL FATE STUDIES

A literature summary of relevant recent environmental fate studies of fire fighting foam agents was commissioned by the Fire Fighting Foam Coalition, a USA based fire industry consortium, to provide evidence on telomers to the EPA investigation. This study revealed that fire fighting foam products, where the ECF-based fluorochemicals and the foams containing them were used, are persistent and mobile in the environment, leaving detectable levels of PFOS and/or PFOA at the fire scenes. On the other hand, foams that use telomer fluorosurfactants were shown to be primarily six carbon, or C_6-based products which are virtually free of C_8-based components. The study also indicated that these surfactants likely degraded to telomer sulfonates of the structure $C_6F_{13}CH_2CH_2SO_3X$ and not to either $C_8F_{17}SO_3X$ (PFOS) or $C_7F_{15}CO_2X$ (PFOA).

DuPont has also been doing extensive environmental fate studies which are indicating that telomer based fluorosurfactants are not toxic and are not bioaccumulative. This is a big reassurance to the environmental regulatory bodies and telomer based foam users that C_6 telomer based fire fighting foams are safe alternatives to replace PFOS containing products.

This confirms that telomer-based fluorinated surfactants like those supplied by DuPont for the fire fighting industry are safe for their intended uses, and help provide equivalent or in some cases superior fire performance over PFOS containing products. This results in fast and effective extinguishing of class B fires, often with less fluorine content but still tolerant to forceful mixing with hydrocarbon fuels and good resistance against re-ignition.

DEFRA PFOS RISK REDUCTION STRATEGY

The UK's Department of Environment, Food and Rural Affairs (DEFRA) has been conducting a risk reduction strategy for PFOS to understand how best to limit the environmental impact of these foams in the UK. This study could

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Foams: PFOS update and the way forward

The latest high performance Niagara foam from Angus Fire in action. Its polymer free multipurpose application gives fast knockdown on hydrocarbon and polar solvent fuels

reasonably report that the PFOS containing products should not be used in future, as this would increase the potential damage to the environment, so safe disposal by high temperature incineration would be a logical outcome. Replacement with alternative products, like telomer based fluorinated fire fighting foams could reasonably follow. We are already starting to see some modern Fluorine-Free Foams (F3) like the new Training Foams that mimic the front line fluorine containing products to allow users to continue training when fluorinated products are not allowed to be discharged except in an emergency. This DEFRA study also follows the provision of the European Union (EU) Existing Subtances Regulations in which the UK is taking the lead role, with several other EU states contributing. Therefore the findings and recommendations of this important Report may later also develop into EU-wide legislation.

THE WAY FORWARD

The way forward is to carry out a foam policy review within your own organisation to try and determine whether the foam currently being used fulfills all of your requirements, whether it is fit for purpose in all the applications for which it is currently being used, and assess whether other products could do this better or not. You may be using a product with capabilities you just do not need, so it may not be the most cost-effective choice for your particular circumstances.

RISK ASSESSMENT

In addition make a detailed risk assessment of your own individual operational factors to define the foam and services you need, both now and into the future as your organisation develops and grows. Look at the hazards you face; the balance of hydrocarbons to polar solvents (if any) on site; whether this may soon change; the volumes of flammable liquids stored and used in processes; the worst fire scenario you could face and what you might need to control and extinguish such a blaze – with the equipment, vehicle systems and fixed foam induction and delivery systems you have already installed; the speed of response of any municpal fire services to help; and any mutual aid facilities you can call on. These are just examples, there will be many more.

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SUPPLIER AUDIT

Then assess your current supplier and look at future potential suppliers to see whether they have continuity of supply? There is a current world squeeze on fire fighting fluorochemical capacity as demand is greater than supply as ownership changes and new production plants are geared up to fulfill the shortfall created in the market by 3M's withdrawal.

Then you need to ask lots of questions? Can they provide you with adequate technical support? Do they even make the product themselves or just buy it in from another manufacturer? Can they help you identify how best to protect difficult or new hazards? Do they have a test site facility where they can show you the foam performing on realistic fires?

APPROVALS CHECK

Can they provide a range of products with internationally recognised independent approvals that are relevant for your particular application? For instance, a product approved for bulk storage tank applications is not necessarily relevant or suitable to an aviation application. Find an approval that is relevant. If in doubt, then the world renowned and respected UL 162 standard and approval from Underwriters Laboratories Inc. (UL) in USA is a sound base level benchmark of performance. Ideally add another more specific approval relevant to your application, like LASTFIRE (tank protection) or ICAO (International Civil Aviation Organisation). Unlike virtually any other foam testing standard, under UL 162 any foam product does not just have to pass the tough fire test in both fresh and seawater. It also has to be stored in drums that will not split, with certain safety information on the label and work with proprietary foam making equipment at a range of temperatures to produce foam quality similar to that which extinguished the fire test. UL listed products are also policed regularly by the strict UL follow-up service, where samples are taken without prior notice from manufacturers and/or users and analysed to verify that the formulation is consistent with the foam product that passed the test originally, so that batch to batch performance quality is maintained for the benefit of the foam user. All this of course is paid for by the manufacturers themselves as part of their service and quality commitment to you, so paying a little more per litre for such a UL listed foam can gain you reassurance, lots more value, plus peace of mind.

Is Factory Mutual (FM) the same as UL? Well no it is not. UL is a not-for-profit organisation looking after the safety of product users not just in fire fighting products. Yes FM do carry out testing, but have no follow-up service. It is a commercially driven organisation and are is also a big insurer, so its interest must be to steer anyone insured by them to use foam and equipment they have already tested to minimise their own exposure if the worst should happen and a major fire incident occurs. All very worthwhile, but not quite as altruistic and firmly on the side of the foam user as the UL testing standards have set out to be!

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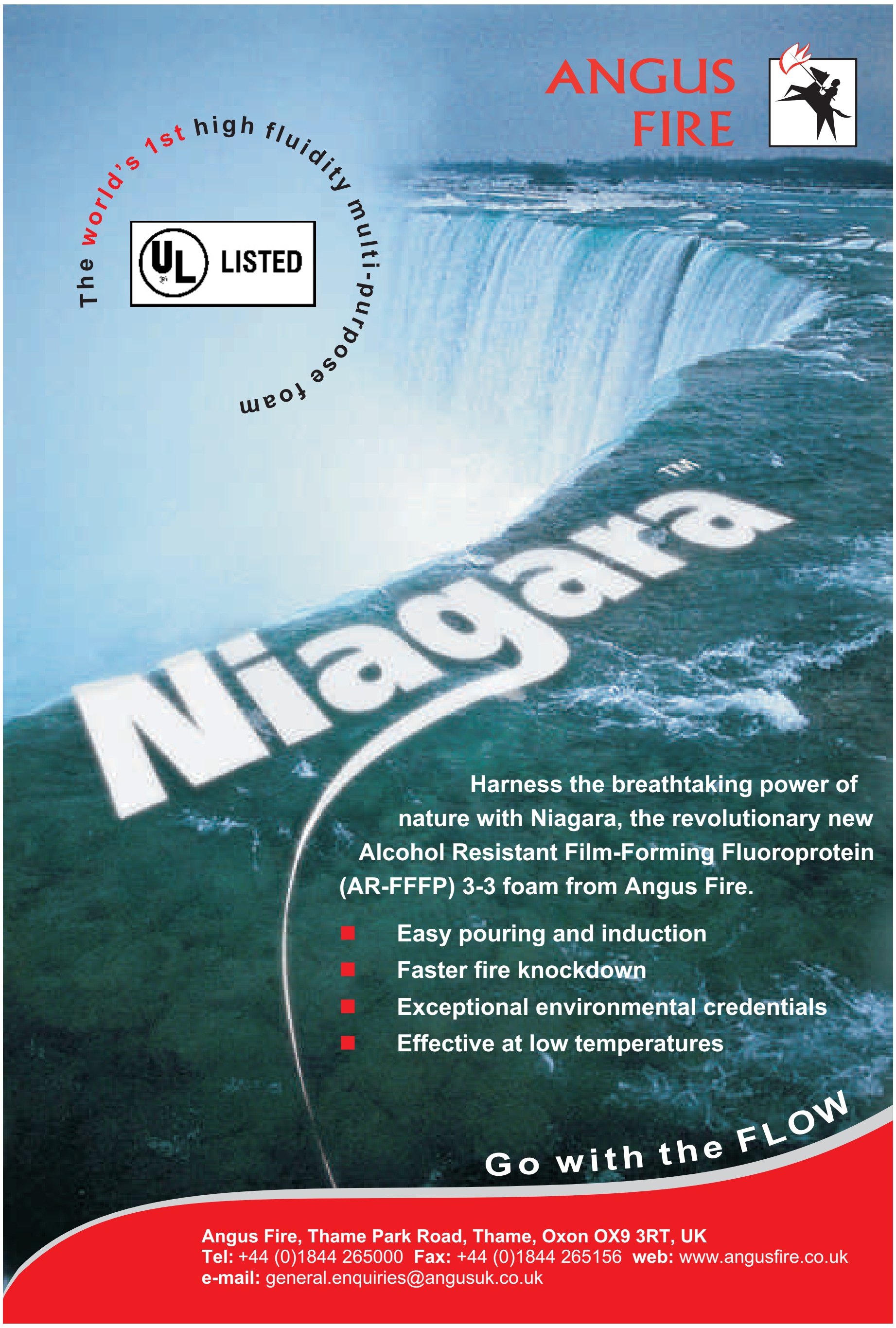

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OPTIMISED PRODUCTS

Does your proposed or current supplier have a detailed understanding of how the various foams work through the different foam making equipment options? No better way to optimise performance of both foam and equipment than when you are in control of manufacturing both products. So it can be beneficial to buy from a manufacturer who makes both foam concentrates and foam making equipment, as a greater depth of knowledge is built up over time in both areas.

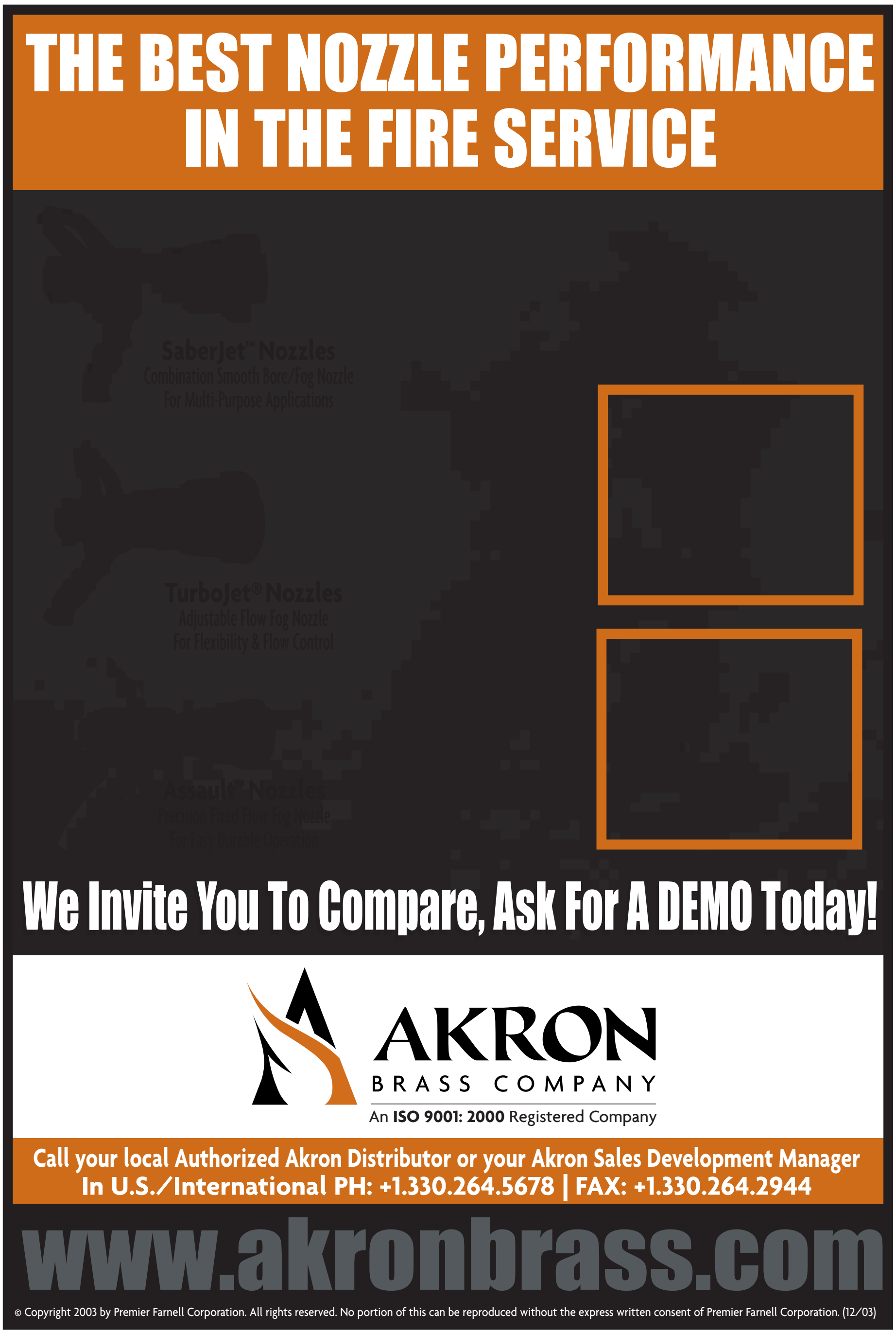
ENVIRONMENTAL DATA

Look for Material Safety Data Sheets (MSDS) for each product. A legal requirement in many countries, it gives you basic safety data for the product, basic chemical groupings contained within the product and an insight into its environmental performance. Look for the aquatic toxicity and biodegradeability data to confirm it is gentle on the aquatic enviornment, will not disrupt water treatment plants and kill fish if accidentally discharged into local rivers during an emergency. As you would expect there are some very large differences between foam types, but also surprising differences between specific products within the same foam type, so you need to look around and ask more questions. Why isn't any aquatic toxicity data stated? Often it masks poor performance, or just not tested. Either way it demonstrates a lack of commitment by the manufacturer/supplier to provide a basic level of encironmental information to you on the products they want you to buy! But without it, how do you know it is not highly toxic in the environment, or potentially hazardous to your fire fighters?

LOOK FOR INNOVATION

Is your current or proposed supplier capable or recognised for developing new and innovative products to help you meet your current needs and future requirements which could include tightening demands from regulatory bodies into the future? Have they even thought about it yet? What is their track record on innovation – are they leaders, with a broad portfolio of products with several alternatives to meet your needs? Do they have both protein based and synthetic based products on offer, or do they just understand the simpler, quicker and easier to make synthetic based products, so are able to give you only half the complex story about fire fighting foams, their relative strengths and weaknesses so they can help you select the right one for your particularly circumstances? Maybe they just follow others with "me-too" products without any significant benefits, but always keep your focus on low prices – about the only way they can entice you to buy, otherwise you would have overlooked them already!

In part 2 Mike will be looking at the following areas, Telomer based, Fluorine free, modern product scores, hydrocarbon tank protection plus much much more. . . .



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BW TECHNOLOGIES LTD.

How customer requirements have shaped the state-of-the-art GasAlertMicro confined space gas detector

BW Technologies Ltd., is one of the world's largest makers of gas-detection equipment. Headquartered in Calgary, Canada, the company's products range from disposable, zero-maintenance personal H_2S detectors, to permanently installed gas detection systems, to the GasAlertMicro, the world's most popular confined space gas detector. With over 50,000 GasAlertMicros currently in service, the instrument has helped to redefine customer expectations for dependability, ease-of-use, affordability and advanced features for confined space instruments.

Confined space gas detector users have not been shy when it comes to expressing their wishes. The state-of-the-art GasAlertMicro is a direct reflection of these customer requirements. The GasAlertMicro offers cutting-edge features and capabilities at a fraction of the cost of previous generations of instruments. In many cases, the $695.00 USD cost of a brand new four-channel GasAlertMicro is less than the cost of replacing the sensors and battery pack in an existing instrument bought only two or three years previously.

Simultaneously displaying oxygen, hydrogen sulfide, carbon monoxide and percent LEL combustibles present, the GasAlertMicro is ideally suited to a wide range of applications, including hazmat response, confined space entry, Homeland Security, search and rescue, and post-inspection fire safety.

The GasAlertMicro's features include high-output audible/visual/vibrator alarms; low, high, TWA and STEL alarm settings; a large, alphanumeric LCD with built-in backlight; two LEL measuring ranges (0-100% LEL and 0-5% by volume methane); a built-in concussion-proof boot; and optional data-logging capabilities. Datalogging GasAlertMicro detectors store monitoring data on a multi-media flash card (MMC) capable of retaining up to a full year of day-in day-out monitoring data.

Field-selectable user options allow the GasAlertMicro to be customized for virtually any monitoring application. Calibration due-dates and alarm settings can be configured to meet specific industry requirements, and the Pass Code protection function ensures tamper-proof operation by preventing unauthorized users from accessing programming or calibration options.

The GasAlertMicro's flexible power options (two AA alkaline or rechargeable NiMH batteries) reduce downtime and provide up to 20-hours of continuous use. GasAlertMicro battery packs are completely interchangeable. Convert from alkaline batteries to a sealed nickel metal hydride (NiMH) battery pack simply by removing and replacing the battery pack currently installed. The available slip-in charger cradle and vehicle mounted chargers ensure that recharging instruments is easy and convenient. At just 211 grams (7.4 oz), GasAlertMicro is truly more for less.

The GasAlertMicro is only one part of the BW approach to simplifying and reducing the costs of gas detection instrument ownership. Regulatory agencies and national performance standards are putting increasing emphasis on periodic testing, calibration, and documentation to ensure gas detection instruments are properly maintained. The BW MicroDock Test and Calibration System automatically tests and documents proper performance. Simply slip the GasAlertMicro into the MicroDock, and push the "Test" button. The MicroDock administers test gas to the instrument, verifies the proper performance of the sensors and alarms, updates this information to the instrument's on-board memory, and stores the results in a separate, downloadable archive on an MMC card in the MicroDock Base Station.

Other available options for the GasAlertMicro include the Sampler motorized sample-drawing pump for pick-hole and remote monitoring applications, additional holsters, protective boots, and chest harnesses. The instrument is also available in the special GasAlertMicro Stealth configuration for Homeland Security, police and anti-terrorist applications. Stealth version detectors are equipped with special silent alarms and infrared LED's visible only with special night vision goggles (NVGs).

Simply put, the GasAlertMicro is the world's best value in confined space gas detectors.

For more information,
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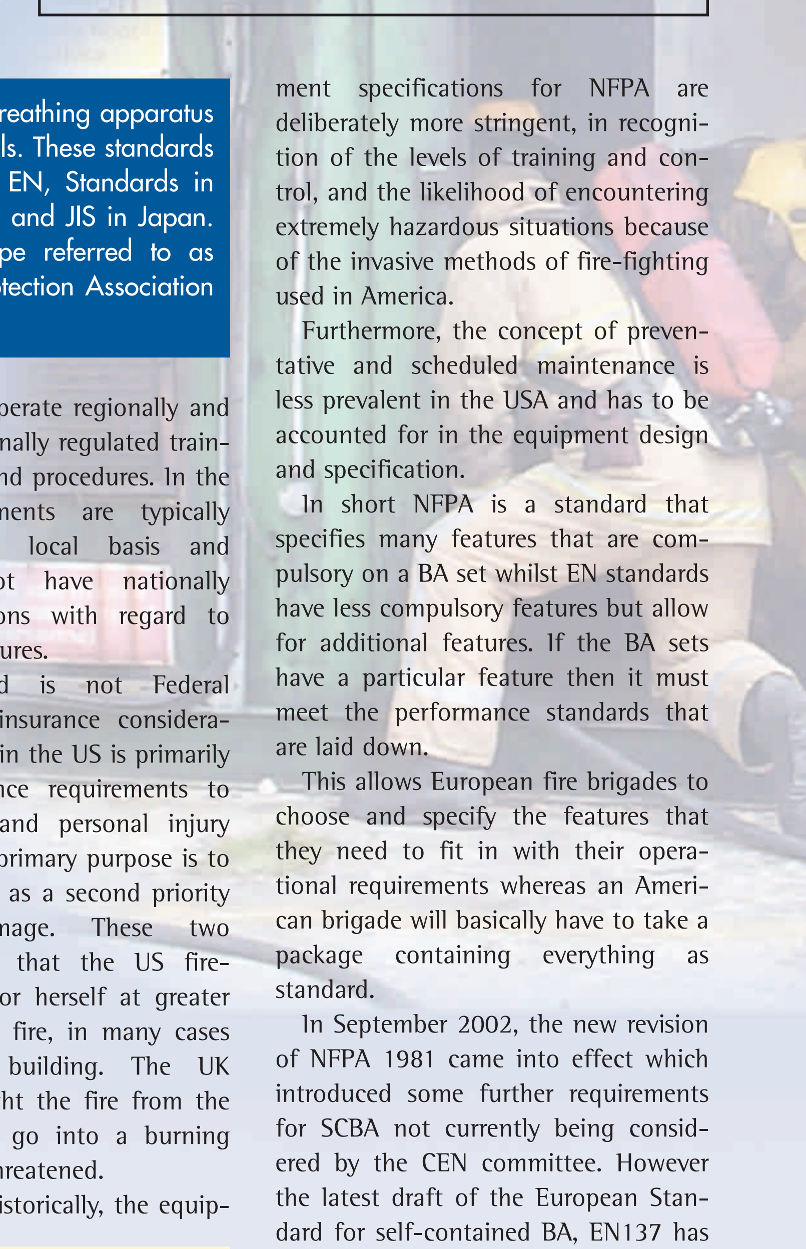
Self Contained Breath Standards

By Tony Pickett, Product Manager – Sabre Breathing Apparatus, Scott Health and Safety



LIKE MOST PRODUCTS that are sold in a global market breathing apparatus have to meet certain standards and are subject to approvals. These standards and approvals vary from region to region and include EN, Standards in Europe, Niosh and NFPA in the US, AS1716 in Australia and JIS in Japan. The two most widely recognised are those from Europe referred to as European norm (EN) standards and the National Fire Protection Association (NFPA) standard as used in the US.

The following will address some of the most pertinent differences between the US standard, NFPA 1981 for fire-fighting breathing apparatus and European Standard EN 137 for self-contained breathing apparatus. There are slight differences between the two standards in aspects such as breathing machine rates used in the performance tests but these will not be discussed here as the end result is very similar.

Although these standards are for similar types of equipment, used for the same types of applications, there are some significant differences that reflect the origins of each standard.

It is also important to understand the context within which the NFPA and EN standards were devised and enforced. The fire service in the United States is 70% volunteer/part-time in comparison to Europe's predominantly professional/part-time. European fire services tend to operate regionally and benefit from nationally regulated training programmes and procedures. In the US, fire departments are typically organised on a local basis and typically did not have nationally enforced regulations with regard to operational procedures.

NFPA Standard is not Federal requirement but insurance consideration. Fire fighting in the US is primarily driven by Insurance requirements to restrict property and personal injury claims. In UK the primary purpose is to safeguard life and as a second priority to restrict damage. These two approaches mean that the US fire-fighter puts him or herself at greater danger to fight a fire, in many cases from within a building. The UK approach is to fight the fire from the outside and only go into a burning building if life is threatened.

Consequently, historically, the equipment specifications for NFPA are deliberately more stringent, in recognition of the levels of training and control, and the likelihood of encountering extremely hazardous situations because of the invasive methods of fire-fighting used in America.

> *In September 2002, the new revision of NFPA 1981 came into effect which introduced some further requirements for SCBA not currently being considered by the CEN committee.*

Furthermore, the concept of preventative and scheduled maintenance is less prevalent in the USA and has to be accounted for in the equipment design and specification.

In short NFPA is a standard that specifies many features that are compulsory on a BA set whilst EN standards have less compulsory features but allow for additional features. If the BA sets have a particular feature then it must meet the performance standards that are laid down.

This allows European fire brigades to choose and specify the features that they need to fit in with their operational requirements whereas an American brigade will basically have to take a package containing everything as standard.

In September 2002, the new revision of NFPA 1981 came into effect which introduced some further requirements for SCBA not currently being considered by the CEN committee. However the latest draft of the European Standard for self-contained BA, EN137 has now identified a new type 2 definition for SCBA used for fire fighting applications. This new type 2 classification will require a flame engulfment test similar to that required for the NFPA 1981 specification. This standard is in the formal comment stage and is likely to be fully ratified late in 2004.

One of the fundamental differences between the US and European approvals is the need in the US to satisfy both an approval and certifying body i.e. NIOSH, who test to Federal regula-

ing Apparatus

tion 42 CFR part 84 as well as obtaining additional qualification to the NFPA performance standard. NIOSH certification is required as a pre-requisite for NFPA approval. Looking at the new En standard a broad brush could be applied saying that the Type 1 apparatus tests are equivalent to Niosh approved apparatus with the type 2 sets being more equivalent to NFPA sets. The CE regime is considerably looser in comparison to satisfy the respective demands of the sixteen CEN member states.

Because of the NIOSH element of this process is it virtually precludes the approval of a European or NFPA configuration SCBA to the other standard as in certain areas the two standards are mutually exclusive. The best example of this is with regard to cylinder connectors, valve and shells. These must all be qualified to the necessary US or EN specifications, US sets for example must use CGA 346 and CGA 347 fittings for low and high pressure respectively whilst European sets have to use a threaded fitting complying with EN-144-2. The cylinder is an integral part of each individual NIOSH set approval and cylinders have to be purchased from the set manufacturer to maintain approval. It is therefore impossible to have a NIOSH/NFPA approved set that does not use an American cylinder and cylinder connection.

In order to highlight the principal differences between these two standards, the following provides a brief explanation of the actual requirements for each of the respective standards:

HEAT & FLAME RESISTANCE

There are two stages of heat and flame tests within NFPA 1981 standard. There is a heat and flame test on material used to secure the SCBA to the user and a complete flame engulfment test of a complete operating SCBA, whereas there is only one flame test currently required for EN 137.

EN137 is currently under revision with a new prEN137 undergoing formal comment. Within this new draft is a requirement for a complete flame engulfment test – similar to that required under NFPA 1981.

The flame engulfment test has received much publicity and debate of late, but with these changes to the European Standard, there will be no discernible differences in terms of product performance in relation to flame resistance between NFPA and EN sets.

The material heat resistance test in NFPA is also critical in meeting the material selection criteria. Swatches of the harness materials are placed in an oven at 500°F for a short period of time. The only materials that survive this test are typically made from intrinsically

> *EN137 is currently under revision with a new prEN137 undergoing formal comment. Within this new draft is a requirement for a complete flame engulfment test – similar to that required under NFPA 1981.*

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flame-retardant materials such as aramid (Kevlar), Nomex or blends of similar type of materials. The disadvantages with these 100% Kevlar materials is that they are very expensive as well as having lower resistance to wear and abrasion than polyamide materials.

VISOR SCRATCH RESISTANCE TESTS

An additional test to meet the NFPA is a visor scratch resistance test where the visor is abraded and has to meet minimum levels of optical clarity. The test basically rubs wool felt polishing pad across the visor with a specified amount of force behind it, a specified number of times before the visor is tested by a machine to measure the amount of hazing.

The standard European EN 136 mask visors do not have to meet this specification, although visors with an NFPA specification can be fitted to the mask if required however this increases cost to the customer as the NFPA visor is considerably more expensive due to the more complex and expensive coating process.

SECONDARY WARNING (EOSTI) DEVICES

NFPA has a requirement for two low-pressure warning devices on each SCBA. These must be entirely independent in operation and each must attract the attention of an independent human sense. Typical approaches to this are providing a visual indicator on the gauge, on the ADSU/PASS or in the facemask as well as a whistle. With the current operational procedures and controls generally employed within the UK and European markets, there is no discernible demand for such a device.

HEAD UP DISPLAY

A new requirement that is being introduced into NFPA standards is the head up display, this must show cylinder contents in at least 4 equal increments from full to ¼ full, a Numeric display alone is not acceptable. There are very strict criteria about the light levels that this head up display must be visible in, from the equivalent of full sunlight to very low light. This HUD could also fulfil the requirement for the secondary EOSTI above. There is no such requirement in the European standards for this although several manufacturers do offer such a device as an option.

VIBRATION TESTS

In this test a BA set is contained within an open topped metal box and shaken for 3 hours at 250 hertz. This is incorporated to simulate a BA set being left unsecured in a pick-up truck where it could roll around for prolonged periods of time between use. This will mean that many loose parts of the BA set will require additional protection possibly making the set bulkier and heavier. The European standards have no equivalent vibration test to this, the assumption being that BA sets should be stored and secured properly in the fire appliances.

RIC CONNECTOR (RAPID INTERVENTION CREW)

This is a fast-fill connector by another name. It will allow rapid charging of an SCBA while it is being used. This can be used for recharging a system or the decanting of air between one SCBA user and another. To do this an appropriate charging hose also has to be

> *NFPA has a requirement for two low-pressure warning devices on each SCBA. These must be entirely independent in operation and each must attract the attention of an independent human sense.*

> *This global market experience is put to best advantage in terms of providing single product solutions that can address the needs of multiple markets.*

provided. One charging connector is specified which operates at 4500psi. A resetting PRV is required on all units to ensure that over charging is avoided.

In the European standard this type of product is incorporated into an annex to the main standard so if it is fitted to a EN set then it must meet the relevant performance specifications but it is not compulsory.

CONCLUSIONS

Whilst comparing the two standards and looking at sets meeting each standard it is clear that most of the primary components of the EN137 approved apparatus i.e. facemask, demand valve, pressure reducer and whistle would pass the NFPA Standard and vice versa. Indeed manufacturers that operate in both NFPA markets and EN markets use near identical primary components on the versions of the sets they market in these different areas.

The incorporation into EN137 of the flame engulfment test for type 2 sets also mean that the materials used to fabricate the harnesses and backplates are of equal flame retardancy to those sets with the NFPA approval.

Because many manufacturers are now global businesses they have a commitment to satisfy the needs of a global marketplace and keep abreast of the developments in all markets. This global market experience is put to best advantage in terms of providing single product solutions that can address the needs of multiple markets. This leads to them developing common basic platforms, however, because of differing market structures and regulations, it is necessary to make superficial configurational changes to product to satisfy local market demands, whilst not compromising the desire to achieve the highest levels of performance. This common platform will therefore generally meet or exceed the basic requirements of most of the different standards throughout the world with the major product differences coming from the market specific additions.

Both standards make sure that manufacturers are making sets that will withstand higher temperatures than the person wearing them can take, provide more air than a human could possibly breath and will therefore provide the highest level of performance to the fire fighter. The different way in which the standards approach the choices that they give the fire brigades will generally mean that an NFPA set can cost 3 to 5 times as much as an EN set purely down to the compulsory features that have to be incorporated for this standard to be granted. With economic pressure becoming a fact of life for both fire brigades and industry alike we may over time see customers moving towards the lower cost option of the EN sets where presently both standards are accepted.

To complete the Jigsaw it is worth mentioning that work has just started on an ISO standard for breathing apparatus, this has the aim of creating one standard worldwide for BA with committee members coming together from Europe, Japan, the US and Australia. This will doubtlessly not be a quick process, it took many years for the European countries to agree before we got to the one EN standard, but in theory the best parts of each standard should come together allowing manufactures to produce one product that will be accepted world-wide.

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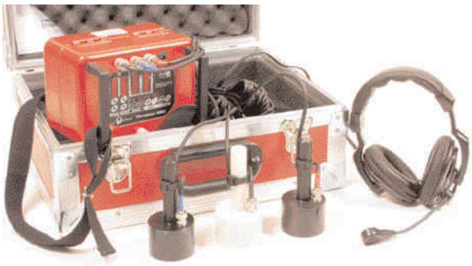
At the time of a building collapse (explosion, earthquake) or of a landslide, people can be buried under the ground or beneath piles of debris. These people may survive several days, in particular if they are in a zone, which contains sufficient air to be able to breathe. It is then essential to locate the victims promptly in order to release them as quickly as possible. To achieve this we have various senses (hearing, sight, touch, sense of smell), teams (dogs), equipment for listening, and visual (infra-red cameras, endoscopes).

The search for trapped victims is initially carried out by collating on-site information (estimate of the number and possible positioning of the victims), complete raking of the search area by the rescuers and dog teams, and finally by electronic equipment for picking up sounds or imagery.

VIBRAPHONE® ASB-8:

Basically, the Vibraphone® ASB-8, electronic listening equipment, is widely familiar to rescue teams throughout the world, having been used in earthquake zones in Turkey, Mexico and Armenia. It enables people buried under rubble, as a result of catastrophes, to be located quickly and accurately. The exceptional sensitivity of the Vibraphone® enables it to pick up the slightest sound made by disaster victims.



In order to carry out the various phases of research, it is very important to have absolute silence. However,
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this type, it is very difficult t
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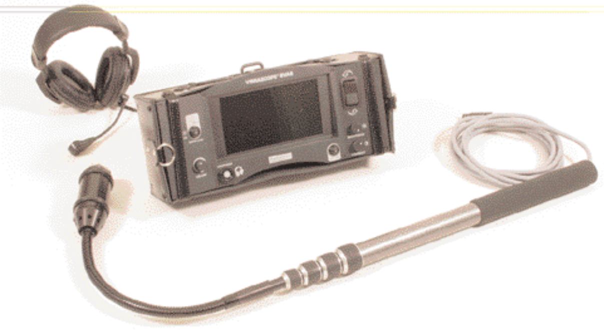
VIBRASCOPE® BVA-6:

The Vibrascope® BVA-6 'snake-eye' camera enables existing channels in disaster rubble to be penetrated and for victims to be contacted via a microphone incorporated in the camera. It comprises a telescopic pole which is fitted with an infrared camera on the end. This camera can rotate 360 degrees, and transmit pictures back to a portable screen monitor. This equipment makes it possible to explore the debris and talk directly with a trapped victim via a microphone incorporated in the pole

For example, at the time of an earthquake where a person is buried, he manages to emit sounds but nobody manages to hear or locate him. The Vibrascope® is then the ideal material for this situation. Handled with care, it requires, like the Vibraphone®, a complete silence on site. The team works in unison: The coordinator, who has the audio and video return of the pole, indicates to his team mate if he may advance or move back so as to position the pole until locating as close as possible to the victim. Once located, it is then possible to communicate with victim, gaining important information on his state and condition, as well as reassuring him until the rescuers are able to release him from the debris.



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Mobile Ventilation Helps First Responders

By Leroy Coffman

OVER THE PAST 18 YEARS, the technique of Positive Pressure Ventilation (PPV) has gained a high level of acceptance in the global firefighting community. While it was initially viewed as a radical approach to fire fighting, it is now an accepted ventilation technique used during fire attack and overhaul.

As knowledge of PPV and its benefits increase, new products and techniques are being developed to apply it in new and innovative ways. One of the most recent advances in PPV technology is the mobile ventilation unit, a large diameter truck or trailer mounted fan that is used to apply PPV to very large structures such as high rise buildings, road and rail tunnels, and airport passenger terminals.

The mobile ventilation unit applies PPV in exactly the same manner as the small PPV blowers carried on emergency apparatus. The primary difference between the two is that the mobile ventilation unit can generate up to 200,000 cubic meters of air per hour, greatly expanding the potential applications of PPV.

MOBILE VENTILATION UNIT DESIGN

A mobile ventilation unit has one primary requirement: that it move a large volume of air. In order to effectively ventilate a high-rise building, subway tunnel, or road tunnel, a mobile ventilation unit needs to be able to generate a minimum of 125,000 cubic meters of air per hour. The more air that a mobile ventilation unit generates, the faster a large space can be ventilated.

To achieve this great air volume, all mobile ventilation units feature a large-diameter ducted fan. This fan consists of an air movement impeller that ranges from 1,100mm (43") in diameter to 1,525mm (60") in diameter that is enclosed in a duct or housing. The housing is specially designed to shape the air into a cone which is critical for PPV to work effectively.

Moving a lot air also requires a lot of horsepower. Whereas smaller PPV blowers feature 5kw (6.5hp) engines, mobile ventilation units feature engines as large as 96kw (130hp). The engine is usually diesel powered and is connected to a belt drive system or a hydraulic pump that powers the fan blade and other control systems.

In addition to generating large amounts of air, mobile ventilation units have the ability to adjust the height, direction, and pitch of the air pattern. These features allow the operator to precisely control where the fan is aimed in order to position the air cone over the entrance opening. A lift system is used to elevate the fan and a rotation system allows the fan to be turned up to 360 degrees. The mobile ventilation unit also features a tilt mechanism that allows the angle of the air cone to be controlled. Nearly every PPV application will require some type of adjustment of the air pattern to effectively apply PPV.

Mobile ventilation units can be mounted on a truck, trailer or hook lift skid. The size of the truck is dependent upon the weight of the mobile ventilation unit and the type of structures it will be used to protect. Most units are self-contained and have their own diesel engine to power the fan and adjustments. Some manufacturers offer an option that uses a power take off (PTO) from the truck to provide the necessary power.

HIGH-RISE VENTILATION

A high-rise building is one of the most difficult structures to ventilate because of its large size and multiple chambers. The small PPV blowers carried on most fire fighting vehicles have a difficult time clearing the stairwells in buildings higher than five stories. A mobile ventilation unit is an ideal high rise ventilation tool because it can produce the air volume and pressure needed to quickly clear the smoke and heat from upper floors.

The mobile ventilation unit can be positioned in front of any opening in the structure that is connected to the area to be cleared. Once the fan is positioned to cover the entrance opening, the air pressure increases equally at all points inside the building. When an exhaust opening is created in a stairwell or upper floor, the smoke and heat exit the building.

Once the stairwells are cleared of smoke, fire fighters can more easily access the fire and conduct search and rescue. They can also clear any floor of the building just by opening the door on that floor and creating an exhaust opening to release the smoke and heat. Victims attempting to evacuate will have a greater chance of survival because they will have a smoke free path of escape.

ROAD TUNNEL VENTILATION

Most modern road tunnels are equipped with a fixed ventilation system that removes carbon monoxide from vehicles and smoke and heat during a fire. While fixed ventilation systems are designed to handle the smoke and heat from a fire, they may not always operate effectively under those extreme conditions. In the event that a fixed system can not adequately control the smoke and heat, a mobile ventilation unit can be an effective supplement. In the event that a tunnel has no fixed ventilation system, the mobile ventilation unit can provide the air movement needed to create a clear path of access for fire and rescue personnel and a clear path of escape for victims.

To apply PPV, the mobile ventilation unit is positioned approximately 30 meters outside the tunnel entrance so that the cone of air completely seals the inside walls of the tunnel portal. When this is accomplished, the tunnel is sealed and air is forced into the tunnel in one large mass from ceiling to floor. This creates a piston effect that forces the smoke and heat out of the tunnel.

When using PPV on a road or rail tunnel, the mobile ventilation unit may need to be positioned to the side of the road or tracks to allow access for emergency vehicles and removal of victims and debris. By lifting the ventilator and aiming the air pattern at the center of the tunnel bore, PPV can be easily applied even while vehicles pass through the tunnel.

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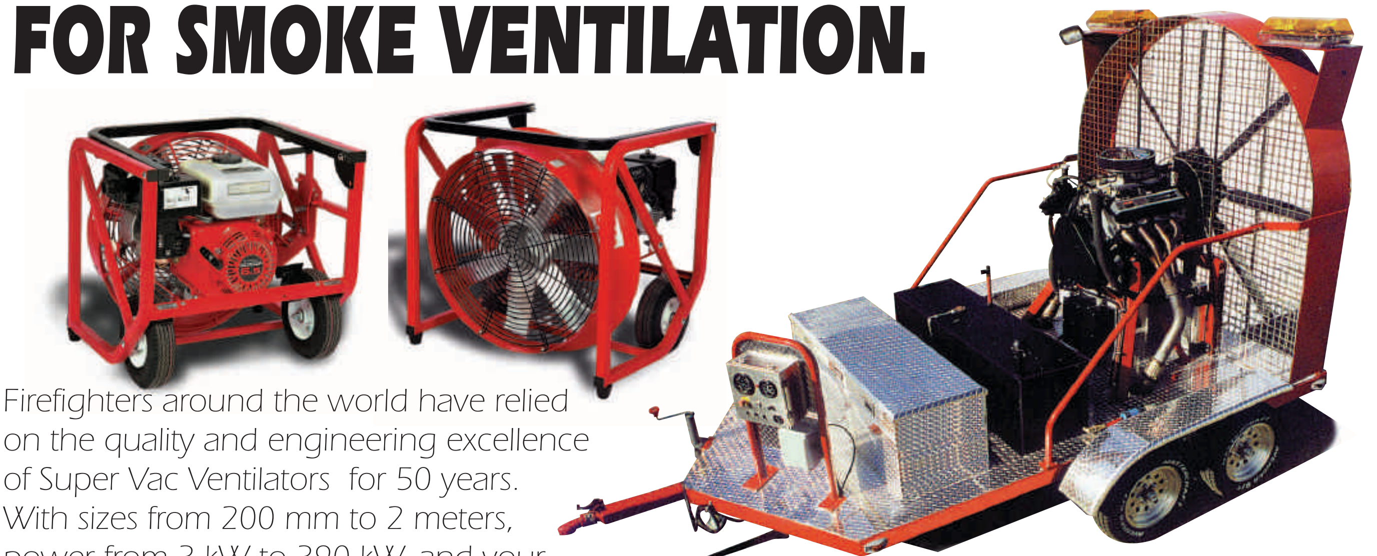

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RAIL TUNNEL VENTILATION

The mobile ventilation unit can be used to ventilate rail tunnels in the same way that road tunnels are ventilated. The primary difference is that the ventilation unit can not be positioned in the center of the track bed to align the air pattern. In most cases, the tracks will need to be clear so that emergency vehicles can access the tunnel and train cars can be removed.

In addition to rail tunnels, subway stations can be cleared of smoke and heat. The mobile ventilation unit can be positioned at a tunnel entrance near the station to direct the smoke and heat away or PPV can be initiated at the station through the escalator lobby. The ventilation unit is located near the entrance to the station and the air flow is directed down the entrance stairway. The station becomes pressurized and the smoke and heat are forced down the tunnel away from the station.

PPV will work even when a train is parked inside a tunnel because PPV works on the principle of air pressure and not air flow. The air movement generated by the mobile ventilation unit will move around any vehicles or trains that are parked in the tunnel.

AIRPORT VENTILATION

Airports can benefit greatly by having a mobile ventilation unit because they have many large structures, a large number of people in a concentrated area, and any disruption of service due to a fire can be very costly.

Even a small fire in a passenger terminal building can cause an entire concourse to be closed while the smoke is removed. Every minute that a gate is closed can cost an airline thousands of dollars. By using a mobile ventilation unit to clear a terminal building of smoke or other harmful gases, the building can be cleared and normal operations can resume in less time.

The mobile ventilation unit is also effective for emergency ventilation of large frame aircraft. Within the next three years, Airbus will begin delivering their newest large frame aircraft, the A-380. The A-380 can carry up to 555 passengers and will include such amenities as a duty-free shop, cocktail lounge, and sleeping cabins. The mobile ventilation unit can quickly clear all of the smoke and heat from an aircraft of this size, making it easier for fire fighters to enter the plane to rescue victims and extinguish the fire.

INDUSTRIAL FIRE BRIGADES

The mobile ventilation unit is proving to be a valuable tool for industrial fire brigades. Large manufacturing operations can be disrupted by a small fire or release of chemical fumes inside an assembly building. Even when the fire is extinguished quickly, lingering smoke can keep production from resuming, costing the company valuable production time. By applying PPV with a mobile ventilation unit, the smoke can be cleared and production can resume in less time.

THE FUTURE OF MOBILE VENTILATION UNITS

The mobile ventilation unit is a quickly deployable tool that offers numerous benefits for fire fighters and organizations that manage risk for cities and airports. Any large city that has an airport, high-rise building or subway system can benefit by having a mobile ventilation. There are a the variety of situations where it can enhance fire fighters ability to get a fire or other emergency under control and speed the search and rescue of trapped victims.

As technology improves, the mobile ventilation units will become smaller, lighter, and more powerful. Modern materials such as carbon fiber and fiberglass will be employed to allow for faster blade RPM, smaller carrying vehicles and easier deployment. This will create even more opportunities to expand the benefits of positive pressure ventilation during fire fighting operations in large structures.

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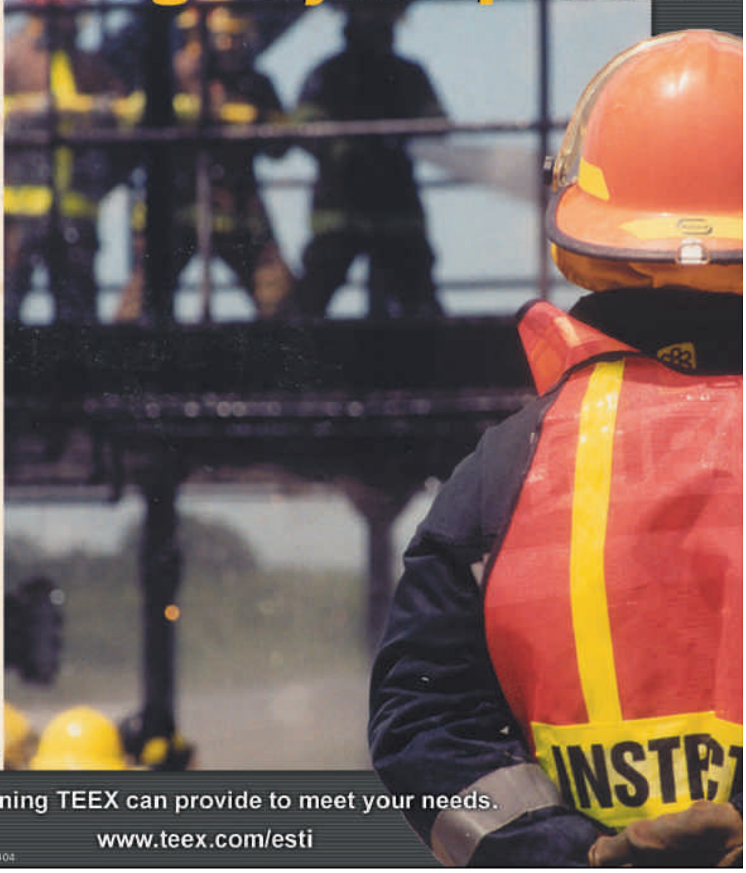

TRAINING CENT

CIVIL DEFENCE ACADEMY – SINGAPORE

Trainees maneuvering a casualty through the confines of the 'Tunnel' simulator

Background

The **Civil Defence Academy** (CDA) opened on 26 March 1999 with the mission to equip Singaporeans and officers of the Singapore Civil Defence Force (SCDF) with knowledge and skills to protect and save lives and property. In recent years this scope has also expanded to provide quality civil defence training for overseas participants.

International Urban Search and Rescue Course (IUSARC)

CDA conducts several international courses each year. Standing out as one of the most popular courses is the International Urban Search and Rescue Course (IUSARC). The 1st IUSARC was held in 1999 and today the course is in its 18th run, having reached out to approximately 340 participants hailing 40 countries worldwide.

The IUSARC is designed for emergency responders in urban settings and those who deal with USAR-related disaster management. The course objectives includes being conversant with the concepts and principles of USAR, and to be able to execute rescue operations proficiently, especially in handling the equipment for such operations. The content of the two-week residential course covers Advanced Rescue Casualty Management, Debris Tunneling, Confined Space Operation and High Angle Rescue Techniques, among others.

Caption

The key thrust of the IUSARC in achieving it objectives lies in realistic scenarios and simulations that allow trainees to have hands-on application of the principles and concepts taught. The scenarios manly revolve around three custom-built facilities located at CDA's field-training area.

The centerpiece is a collapsed-rubble structure aptly called the '*Ruins*'. Measuring approximately 25m by 25m, it is equipped with a basement and voids for trainees to penetrate to extricate 'victims'. The '*Tunnel*', on the other hand, is a single enclosed passage that leads to a network of rooms with pathways obstructed by concrete slabs that trainees need to break apart. The '*Houdini*' is an upright duct system that challenges the vertical-rescue capabilities of the trainees in very confined environments.

If you wish to find out more about the course, and other programmes that are available, please feel free to contact the Academy's Corporate Affairs Branch

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or direct your emails to
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EMERGENCY RESPONSE TRAINING, A WORKPLACE NECESSITY

WORMALD

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Emergency Response Training teaches staff to respond to all kinds of emergencies. For example fire, explosions, gas leaks, floods, earthquakes and bomb threats, equipping employers and employees with skills that can save lives and reduce damage to property.

As a world leader in fire and safety systems, Wormald's Fire Safety Training department has provided comprehensive and professional training to clients across Australia within the aviation, health-care, education, corporate and government sectors for more than seven years.

Specific training covering both fire extinguisher and evacuation procedure training is now being required by some Councils and Insurance Companies, making it an integral part of workplace safety and most of Australian States have some form of regulations that require employers to provide evacuation procedures for their employees.

Wormald's National Training Manager, Rod Rolfe said "The key influence in a hazardous situation is the human response to it. The impact of a crisis can be substantially reduced when people are trained to respond to the crisis correctly."

Wormald's Fire Safety Training policy, is to have a single dedicated trainer appointed to each client/organisation in order to develop a close working relationship with that client/organisation. "Our training methods and procedure manuals are customised to suit each organisation's requirements and we strive to stay close to our clients before, during and after training."

Wormald's Fire Safety Training department provides a range of training programs including Evacuation Procedure Training, Fire Extinguisher Training, both Nationally Accredited and Non Accredited Courses.

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RES ROUND UP

THE FIRE SAFETY ENGINEERING COLLEGE

The Fire Safety Engineering College, situated in Muscat, Sultanate of Oman offers a comprehensive range of Fire, Safety, Well Engineering and Facilities Management courses, unique to the Middle East.

The College provides a mix of vocational and academic programs, leading to the award of certificates, diplomas and degrees. Practical training is conducted on an extensive fire ground utilising a fleet of modern pumping appliances and ancillary equipment.

Accredited by the University of Central Lancashire, England, the College currently offers pathways to three BSc degrees:

- **Fire Safety Engineering**
- **Well Engineering**
- **Facilities Management**

The College is approved by the Ministry of Higher Education, Oman to deliver these courses to University Diploma level. The final year(s) are conducted at the University of Central Lancashire, England. At present, the College has 400 full time students enrolled in these programs and a further twenty or so undertaking courses on a part time basis. The next semester which commences in September 2004, will see student numbers increase to 600.

The Ministries in Oman provide sponsorship for around 200 secondary school leavers, attending The College; the remainder are from the Government sector and industrial clients from around 19 countries across the GCC, North Africa, India and the Middle East in general.

In the field of vocational training, The College offers around 100 short and mid-duration courses, ranging from basic firefighting to command & management. All courses are internationally accredited and make best use of NFPA & British standards. The College was recently accredited by the International Fire Service Accreditation Congress (USA) to deliver Firefighter 1 & 2 to NFPA standards. The College is the only organisation in the Middle East with this accreditation.

Aviation Fire training courses play a major role in the College curriculum. The College has two 6 X 6 and one 4 X 4 Carmichael crash rescue trucks that the students are able to use to realistic effect to attack fires on the comprehensive aviation training simulators, comprising of a full size aircraft, military jet and helicopter. Training is conducted to ICAO standards and is accredited by the UK Civil Aviation Authority International Services Department.

The College has recently joined forces with Safety Solutions UK Ltd to establish the Centre for Safety Excellence, offering a comprehensive range of Health, Safety & Environmental Courses. All courses are accredited to international standards.

The College is continually seeking to expand its product range to appeal to a wider range of clients and countries. Enquiries are welcome from anywhere in the world and should be addressed to:

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ICET

ICET

International Centre for Emergency Techniques

The International Centre for Emergency techniques (ICET) is a specialist of world renown in the development of muliti-disciplinary rescue training and consultancy programmes. ICET created the Systematic Approach to Victim Entrapment Rescue, SAVER™. This method is a truly interactive and universal approach to this demanding form of rescue.

ICET's consultancy department has assisted numerous local and national Governments as well NGO's in developing programmes to establish, support and upgrade emergency response networks. Under its RENU™ programme ICET has worked in countries as diverse as India, Argentina, Russian Federation, Belgium, the Netherlands and Turkey.

Recently, the SAVER Foundation incorporated the SAVER approach for further research and development. Emergency Medicine Prof. Dr. Marc Sabbe (Brussels) is Chairman of the Foundation.

Today, ICET is an international provider of technical assistance and training and the international representative of SAVER. In the United Kingdom, SAVER training is provided by the Fire Service Training Centre of the Lancashire Fire and Rescue Service. In 2003, SAVER released a CD Rom of the basic SAVER course and on line examination. The English version of the CD Rom was released in released in May of this year.

ICET most recently introduced training course is called "Command and Coordination for incident commanders". During this course both virtual (Diabolo VR) and realistic scenarios are used to present the participant with a variety of leadership challenges. The course was recently taken by senior officers from the Malaysians Fire and Rescue Department, with international fire and rescue veteran Joe Bishop, one of the ground layers of the INSARAG guidelines, as a course director.

For more information, please contact
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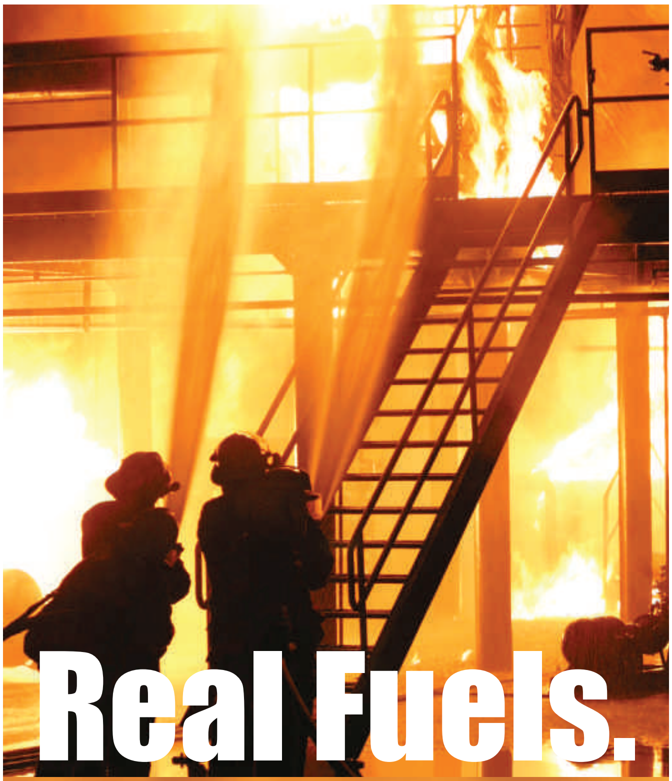

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Offering one of the finest emergency response programs and training facilities in the world, the University of Nevada, Reno Fire Science Academy (FSA), in Carlin, Nevada USA, presents specialized instructional programs — conducted at the state-of-the-art academy or customized and offered anywhere in the world.

The FSA conducts training and consulting in:

- Industrial Fire Fighting
- Crisis and Emergency Management
- Incident Command and Response
- Aircraft Rescue and Fire Fighting (ARFF)
- Industrial Rescue
- Hazardous Materials
- Instructor and Train-the-Trainer Programs
- Specialty Training and Customized Programs

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E-mail: fireacademy@unr.edu • Web: fireacademy.unr.edu

IDESS

International Development and Environmental Shipping School

Pic courtesy of IDESS

IDESS is an ISO 9001:2000 certified Company and has earned a reputation for quality and innovation. The organisation is recognised as one of the leading providers of training in fire prevention and fire fighting for the industries it serves. IDESS fire fighting courses have been developed by experts from Norway and the U.K.

IDESS was established in Sweden and Norway in 1989 and has been in the Philippines since 1991. The organisation provides a broad range of training services, which are principally aimed at meeting the needs of the offshore oil and gas industries, as well as the international shipping industry.

Located in Subic Bay, the IDESS fire fighting centre is one of the best equipped facilities in Asia. It offers comprehensive instruction in all aspects of fire theory, fire prevention, practical fire team operations as well as command and control. Some courses are delivered at the customers site upon request.

IDESS also develops interactive computer based learning programs covering the basic knowledge elements required by firefighters.

Current learning modules are:

Elements of Fire, Fire Prevention, Fixed Fire Fighting Installations, Portable Fire Fighting Equipment, Personal Protection (including use of breathing apparatus), Shipboard Fire Fighting Organisation and Fire Fighting Principles.

These modules are of exceptional quality and value.

Pic courtesy of IDESS

Pic courtesy of IDESS

IDESS fire fighting courses are recognised by government and private sector industry authorities around the world. Among these are the Maritime and Coast Guard Agency of the U.K., and the organisation for approval of oil and gas industry training standards, OPITO.

IDESS continues to develop new and innovative training methods to meet the challenges of fire fighting and fire prevention.

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The **Refinery Terminal Fire Company** (RTFC) was established in 1948 and is a Texas Non-profit Corporation. The Fire Company operates as a "Cooperative" providing emergency response and training for it's refining and petrochemical membership.

RTFC through the unique concept of ownership by its members provides state-of-the-art fire protection, prevention, inspection, hazard mitigation and technical support services. The objective of the RTFC Training Academy is to organize, maintain and operate a specialized academy to provide experience and training in fire protection and emergency response. Let us build a curriculum tailored to your needs.

RTFC is uniquely positioned to provide relevant, practical and up-to-date instruction through our career staff, member company employees and adjunct faculty. We apply experience gained from actual incidents. We teach in depth from lessons learned in various emergencies. The Training Academy sharpens and refines techniques and teaches from the ground up.

For additional information contact:
John D. Lowe, Division Chief
Refinery Terminal Fire Company
Training Academy
P.O Box 4162
Corpus Christi, Texas 78469-4162
Tel: 361- 885 – 7127
Fax: 361- 241 – 0943
E-mail: jdlowe@rtfc.org

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The **Emergency Services Training Institute** (ESTI) trains more than 50,000 emergency response personnel from

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Pic courtesy of the Emergency Services Training Institute

each of the 50 United States and more than 40 countries each year. ESTI training addresses emergency response scenarios ranging from firefighting to rescue to emergency medical to hazardous materials. ESTI's state-of-the-art training takes place at the Brayton Fire Training Field in College Station, Texas, the Center for Marine Training and Safety (CMTS) in Galveston, Texas, at regional training sites located around the country, and at client locations worldwide. ESTI is one of several divisions of the Texas Engineering Extension Service (TEEX) that, combined, train more than 120,000 people each year in emergency and public works vocations. TEEX is a Member of The Texas A&M University System.

The Brayton Fire Training Field is one of the largest live-fueled, firefighter training facilities in the world. The 120-acre site is home to 132 "props" or specific training stations, including 22 fueled, live-fire props.

The props range from full-scale buildings to chemical plant structures, from aircraft to ships and trains, and include Disaster City, an urban infrastructure simulation complete with a shopping center, home, public assembly, and other buildings designed to simulate various states of collapse caused by a natural disaster or terrorist activity.

ESTI's training programs and courses are constantly revised and updated to incorporate the latest legal, technological, and procedural standards and innovations. Emergency responders are kept abreast of the new opportunities and developments in their fields and gain valuable classroom information and hands-on experience to better handle the ever-changing dangers facing fire and rescue personnel. All ESTI instructors are certified and have extensive experience in their subject areas. Courses consist of quality interactive lectures and demonstrations conducted first in a classroom setting and later practiced during extensive hands-on training exercises using realistic full-scale training props and scenarios.

ESTI offers more than 130 courses to clients around the world; many of those courses are tailored for each delivery to address individual client needs and requirements. Courses meet or exceed the highest national standards–including NPQS, NFPA, DoD, US Coast Guard, EPA and OSHA. In addition, a Bachelor's Degree Program in Emergency Management Administration is available online.

For further information, please contact:
Emergency Services Training Institute
301 Tarrow
College Station, TX 77840-7896
Tel: +1 866 878 8900 or
+1 979 845 7642
Website: www.teex.com/esti

THE UNIVERSITY OF NEVADA, RENO FIRE SCIENCE ACADEMY

Offering one of the finest emergency response programs and training facilities in the world, **the University of Nevada, Reno Fire Science Academy** (FSA) includes a 426-acre, state-of-the-art campus in Carlin, Nevada, and specialized training programs conducted at our campus or customized and offered anywhere in the world.

Crisis and Emergency Management

The FSA trains industries, organizations and governments in the preparation for, management of and recovery from crises and emergencies ranging from natural disasters to man-made emergencies and terrorism, including:

- Incident Command and Emergency Response
- Incident Command System (ICS) and Emergency Medical Services (EMS)
- Incident Safety Officer
- Developing and Implementing Tabletops, Drills and Exercises
- Hazardous Materials On-Scene Commander

Hazardous Materials/HAZWOPER

The FSA trains in containment, confinement, decontamination, first responder and incident command, including:

- HAZWOPER/Hazmat First Responder Operations
- Hazmat On-Scene Commander
- HAZWOPER/Hazmat Technician and Refresher
- Hazmat Advanced Response
- Hazmat Chemistry
- Emergency Response Team (ERT) – Comprehensive Refresher Training

Industrial Fire Fighting

The FSA has received worldwide recognition for its industrial courses, training props and use of liquid petroleum fuels, including:

- Industrial Firefighter I, II and Refresher
- Fireground Operations and Leadership
- Production Pipeline
- Mine Fire Brigade, Shipboard and Offshore Fires
- Emergency Response Team (ERT)–Comprehensive Refresher Training
- Industrial Firefighter Certificate Program

Aircraft Rescue and Fire Fighting (ARFF)

The FSA is one of only a few in the world to offer aircraft fire simulation training with liquid petroleum fuel, including:

- ARFF/FAA/CFR 139.319 Annual Live-Fire Refresher
- ARFF 40-Hour CFR 139

Rescue Training

The FSA's capabilities are second to none in training rescuers for demanding levels of performance, including:

- Introduction to Trench and Excavation Rescue
- Rope Rescue
- Confined Space Rescue
- Advanced Rescue
- Emergency Response Team (ERT) – Comprehensive Refresher Training

Instructional (Train-the-Trainer) Courses

Techniques for delivering effective instruction and training to others are emphasized in these FSA courses.

Specialty and Customized Training Programs

Our world-class facilities and instructors are available to companies and organizations that require specialized training. The FSA can also bring its programs to you, anywhere in the world.

For More Information, please contact:
University of Nevada, Reno
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SIMULATION TERS LTD

PROVIDER OF LIVE FIRE TRAINING SIMULATORS

With six years' experience of designing, manufacturing, installing and maintaining fire training simulators, **Simulation** are acknowledged as a leading provider of live fire **T**raining and **E**quipment for the **R**escue **S**ervices.

As a provider of completely bespoke training rigs, Simulation are able to provide live-fire training facilities to numerous sectors, in a number of capacities. Simulation are specialists in the provision of aviation fire training, as well as training rigs for the Military, Local Authority, Industrial, and the Offshore Oil and Gas and Maritime Sectors

Because of the bespoke nature of our training rigs, any size or type of facility can be catered for – from a Boeing 747 to a Light Aircraft, a complete Fire House to a Fire Attack Unit, or a Ships compartment through to a whole ships deck on many levels. The common denominator is our state of the art technology, that ensures training safety and ease of operation. Virtually any crisis situation can be replicated by Simulation's training rigs, numerous fire scenarios being controlled and monitored remotely.

Our ability to apply gas or fuel driven technology to create the type and size of fire needed specifically by each client has seen our expertise diversify from Civil Aircraft through to meeting demand in a number of different sectors:

Civil Aircraft

These simulators are provided to our Clients to enable them to satisfy the Civil Aviation regulatory body that they have achieved the requirements set out in CAP 699:

> *"All RFF personnel shall be properly trained to perform their duties in an effective and efficient manner and shall participate in live fire drills commensurate with the types of aircraft and types of RFF equipment in the use at the aerodrome, including pressure-fed fuel fires. Training facilities shall be commensurate with the type and size of aircraft in use at the aerodrome."*

We have successfully commissioned aircraft simulators both in the UK and abroad. These simulators cover a range of aircraft and combinations of aircraft. They are fuelled either by LPG or Kerosene or increasingly dual fuelled systems are preferred..

Military

We have provided numerous fire-training simulators for the Ministry of Defence. This includes the design and build of a Multi-purpose Military Aircraft Simulator for the MoD Fire Service Central Training Establishment (FSCTE) at Manston, Kent. The unit is believed to be the largest Hot Fire Aircraft Training Simulators within the MoD. The main fuselage is based on that of a wide-bodied civil aircraft, but other areas of the simulator incorporate features of a Tornado jet fighter, Sea King helicopter and Hercules transport aircraft.

Naval

Simulation was chosen as a preferred supplier to the £60 million project in Cork, Ireland to build the premier naval training facility in the world. The National Maritime Training Centre will provide the most comprehensive training internationally to over 800 students per year.

The Centre is due to open in October 2004, but is already drawing delegates from all over the world to view the comprehensiveness and quality of the site. To that end, Simulation has provided what will prove to be one of the most innovative and realistic ships simulators available for Naval Live Fire Training.

Industrial

We have successfully commissioned many LPG fuelled petrochemical simulators.

Simulation offers a truly consultative service. With you at every step from conception to commissioning, we offer advice in such areas as drawing up specifications in the early stages, to a comprehensive training session for the Fire-fighters when the rig is commissioned. Our approach is to listen to the customers needs to create bespoke rigs that meet the requirements of our end user. Input is encouraged from all levels in the design as we strive to create the perfect rig, first time. We also make available to our Clients a number of other services, including modular builds to spread costs, as well as two mobile fire-training solutions – The Transportable Fire Training Simulator and a Mobile Fire Truck.

Simulation

For more information,
please contact:
Mr Steve Fahey

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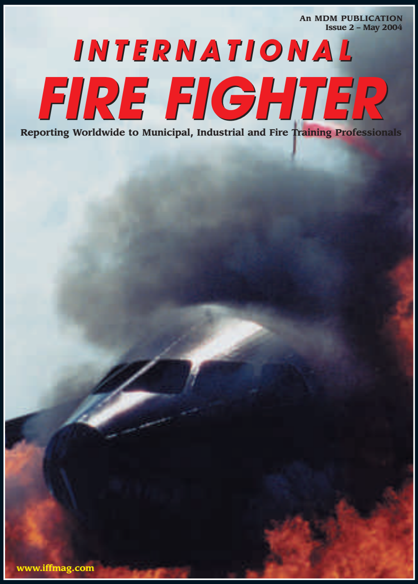
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BILCO OFFERS THE LUMIVENT™ AUTOMATIC FIRE VENT

The Bilco Company’s Lumivent™ provides natural daylight, energy efficiency, and the protection of automatic fire venting – all at competitive pricing.

The Lumivent™ features translucent Lexan® Thermoclear® glazing, an innovative polycarbonate material manufactured by General Electric. The vent’s unique multi-wall cover construction provides an increase of over 40 percent in insulation performance when compared to traditional domes. Thermoclear® maximizes light transmittance while minimizing solar heat gain and is surface treated to prevent ultraviolet degradation.

The Lumivent™ is designed to open automatically in the event of fire, allowing smoke, heat and gases to escape from a burning building, assisting firefighters in their containment efforts. Fire vents are ideally suited for buildings with large expanses of unobstructed space such as factories, warehouses, auditoriums and retail facilities.

Bilco’s patented Thermolatch® II latching mechanism provides reliable vent actuation and prevents inadvertent opening of the covers that can be caused by wind or building vibrations. Thermolatch® II also allows the covers to be reset from the roof level in a safer, more expedient manner. Additional standard features include fully gasketed weather tight construction, interior and exterior pull handles for manual operation, zinc plated and chromate sealed hardware, and the Posi-Flash™ flashing system for faster, more secure installation in single-ply roofing applications.

For further information, please contact:
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GROUPE LEADER INTRODUCES THE MT236, DESIGNED FOR RAPID SMOKE EXHAUSTION

An ultra-compact positive pressure ventilation (PPV) smoke ventilator from French company **Groupe Leader**, the MT236 has the best airflow/size ratio on the market. Already the leader in its category in Europe, the MT 236 has become an essential tool for fire fighters.

The airflow from the MT236 can reach 36,000 cu. m per hour. This capacity ensures rapid smoke exhaustion, an immediate fall in temperature and the return of visibility conditions that are essential for the effectiveness of rescue teams saving victims.

The powerful air jet is driven by a resin turbine, and an enveloping frame protects all the components of the PPV ventilator. As its dimensions are reduced to the minimum, the MT236 can easily be housed in any vehicle. It is powered by a petrol engine and fitted with an automatic cutout system in case of low oil.

The MT236 is part of the MT200 range designed by Groupe Leader. The range consists of four portable 4-stroke engine PPV ventilators for use by fire fighters in smoke-filled premises. With rapid smoke extraction, this equipment ensures better visibility, lower temperature and a reduction in toxicity. Their size and design makes all the models in the MT200 range stable and easy to handle and transport.

In order to expand internationally, Groupe Leader seeks trade partners for the distribution or inclusive import of its products.

For more information, please contact:
Groupe-Leader
Tel: +33 235 530 575
Website: www.groupe-leader.com

NEW FROM HOLMATRO: ‘VEHICLE EXTRICATION TECHNIQUES’ GUIDE

Holmatro now introduces ‘Vehicle Extrication Techniques’, a compact yet comprehensive guide on rescue tool handling and vehicle extrication. This 100-page booklet has been written with the latest developments in vehicle construction and rescue equipment design in mind. As it provides a step-by-step explanation of different basic extrication techniques with the help of many full-colour illustrations this guide is highly suitable for training purposes or for use as a reference book at the site of the accident. Discussing topics like safety, vehicle design and construction, equipment, heavy vehicles techniques and – very extensively – basic vehicle extrication techniques the booklet can easily be incorporated into any training programme. Alternatively it can be used individually, to brush up on one’s personal skills. Holmatro has kept the price of its new guide as low as possible to ensure that every rescuer can have access to this useful information.

For further information, please contact:
Holmatro Rescue Equipment
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HSI FIRE & SAFETY GROUP

a division of Home Safeguard, Industries

HSI Fire & Safety Group, a division of Home Safeguard Industries, is the worlds’ leading manufacturer of aerosol smoke alarm testers. Since 1979, as the innovator of the *first* aerosol smoke tester, the Company has built a global presence serving the commercial fire alarm and security industries with our patented test tools and aerosols including Smoke Detector Tester™, Heat Detector Tester™ and related products and accessories.

HSI recently expanded its equipment offering with the introduction of their *new* Versa-Tools™ Detector Test Equipment Series. Versa-Tools™ provide the alarm service & maintenance professional with the perfect system to functionally test smoke and CO detectors.

The Versa-Tools™ series includes the Versa-Test™ aerosol dispenser (VT-1), the companion Versa-Pole™ telescoping test pole and test pole extension (VP-16; VP-4X), and the Versa-Tools™ equipment bag. The Versa-Tools™ series of products are available in a convenient kit (VTKit-1) or sold separately.

HSI also recently expanded its aerosol product line now making it the most extensive line of detector test and maintenance aerosols in the industry. In addition to its standard Smoke Detector Tester™, the Company has introduced a new 4.87 oz “Super Sized” tester as well as a convenient .25 oz “pocket sized” tester. Plus, it has added Smoke Detector Tester Plus™, a 100% non-flammable formulation. All of these aerosols are UL & ULC listed, meet NFPA test requirements, and are approved by the world’s leading commercial alarm manufacturers for use on their detectors.

For further information, please contact:
HSI Fire & Safety Group
E-mail: expert@homesafeguard.com
Website: www.detectortestequipment.com

NEW WEBSITE LAUNCHED

www.hughes-safety-showers.co.uk

Hughes Safety Showers, Europe's largest manufacturer of Emergency Safety Showers, Eyebaths and Decontamination equipment, has redesigned and expanded its website to give even faster access to the Company's complete range of products.

The site has information on industry standards and legislation, and offers practical advice on selecting and looking after this equipment.

"It's bigger, better and even easier to use," says Managing Director Tony Hughes. "We have pulled together all the information required to make the right decisions for selecting and looking after this potentially life saving equipment."

Information on the company's export product range is available in four languages.

Visitors to the site can check out new products, download literature and data sheets and order free copies of the Company's training videos, CDs and posters.

For further information, please contact
Hughes Safety Showers Ltd.
Tel: +44 (0) 161 430 6618
Website: www.hughes-safety-showers.co.uk

RECTORSEAL® T PLUS 2® FGG/BM SYSTEM COMPATIBLE

The RectorSeal® Corporation is pleased to announce that under the Noveon FGG/BM™ System Compatible Program, RectorSeal® T plus 2® Pipe Thread Sealant is now listed and found to be chemically compatible with FlowGuard Gold®, BlazeMaster® and Corzan® pipe and fitting systems.

RectorSeal® T plus 2® is a non-setting, Teflon* enriched premium pipe thread sealant suitable for use on PVC, CPVC, Polyethylene and ABS plastics as well as galvanized steel, stainless, brass, copper and aluminum threaded connections. It allows for immediate pressurization on a wide range of service materials including hot and cold potable water systems. It is non-toxic in accordance with NSF Standard 61.

A leading manufacturer of specialty chemical and tools, The RectorSeal® Corporation continues to provide innovative quality products designed for the professional tradesmen. Additional RectorSeal® products found to be FGG/BM™ system compatible include Metacaulk® 1000 and Metacaulk® Wrap Strip firestop products as well as Better Bubble‘ leak locator.

Founded in 1937, RectorSeal® has grown steadily over the years through a commitment to providing high quality products and services. With a diversified business strategy, the company is aggressively pursuing new and unique technologies to serve the plumbing, hardware, heating, air conditioning, and construction markets both domestically and internationally. RectorSeal® is devoted to providing innovative quality products supported by strong customer and technical service.

For further information, please contact:
RectorSeal Corporation
Tel: +1 713 263 8001
Fax: +1 713 263 7577

"BUFFALO" SERIES AIRPORT FIRE TRUCKS

Although the majority of airports keep steadfastly to the concepts of ICAO or NFPA, there are smaller domestic or military airports (with the exception of some Scandinavian countries) that prefer to use more cost effective fire fighting trucks, and these are produced on a commercial based chassis. These trucks are normally adapted from the standard chassis, usually with crew cabs, single rims and fitted with the maximum available power packs as well as automatic transmission to meet some of the basic needs of the ICAO specs, but usually not all.

Airports up to Category 5 are often using these types of trucks, and they are very popular for use as an RIV, using mainly either the Scania P124 chassis or the Mercedes Benz 1328, both of which offer pump and roll with single rims and fully automatic transmission, and with the correct capacity can offer acceleration of 0-80 km/hr in 25 secs.

The basic requirements in terms of tank capacity, discharge rates and complimentary agents re still met in most cases, but the cost level is of course much lower, and will result in a cost base of around half to two thirds of that of a full crash tender.

An example of such a machine is shown here, and is a member of the Rosenbauer Buffalo series. This truck is in use with a military base in Asia and has a basic specification but adequately to meets the needs of the customer.

The unit is based on a Volvo FM10 4x2 chassis, with a manual transmission and sandwich PTO, and twin rear rims, and is fitted with a 7250-litre water tank and 750-litre foam tank, and a CO$_2$ complimentary agent system.

A remote controlled Rosenbauer RM60E monitor flowing 3600-litres is fed by an R600 pump and Foamatic induction system. The ability to have a standard commercial chassis has also the advantage of locally available spares and service from the truck dealer; this can be more cost effective from a maintenance point of view.

The trucks are more compact as well, and will be more easily accommodated in confined stations, which tend to exist at the smaller airports.

If value for money is the criteria and not full ICAO or NFPA requirements are the focus, then in most of these cases, the Buffalo is the ideal answer to the Finance dept's call to reduce capital spending.

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SUPER VAC'S NEW MOUNTAIN MISTER

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Super Vac's new Mountain Mister will easily convert your existing PPV or Smoke Ejector into a cooling rehab fan. The Mountain Mister is easily attached to the outlet guard of the fan to produce a cooling mist without the need of additional hardware or tools. The injected mist into the centre of the air stream provides the maximum cooling range available. Perfect for increasing fire fighter comfort and reducing the effects of heat stress during extended summertime operations. Using 3 GPM, the Mountain Mister comes with a ¾″ garden hose connection and a ¼-turn shutoff valve.

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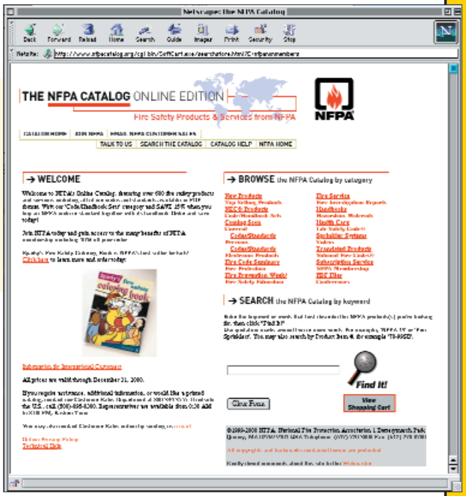
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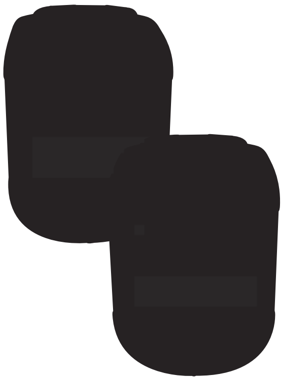

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APF

An MDM PUBLICATION
Issue 11 – September 2004

ASIA PACIFIC FIRE MAGAZINE

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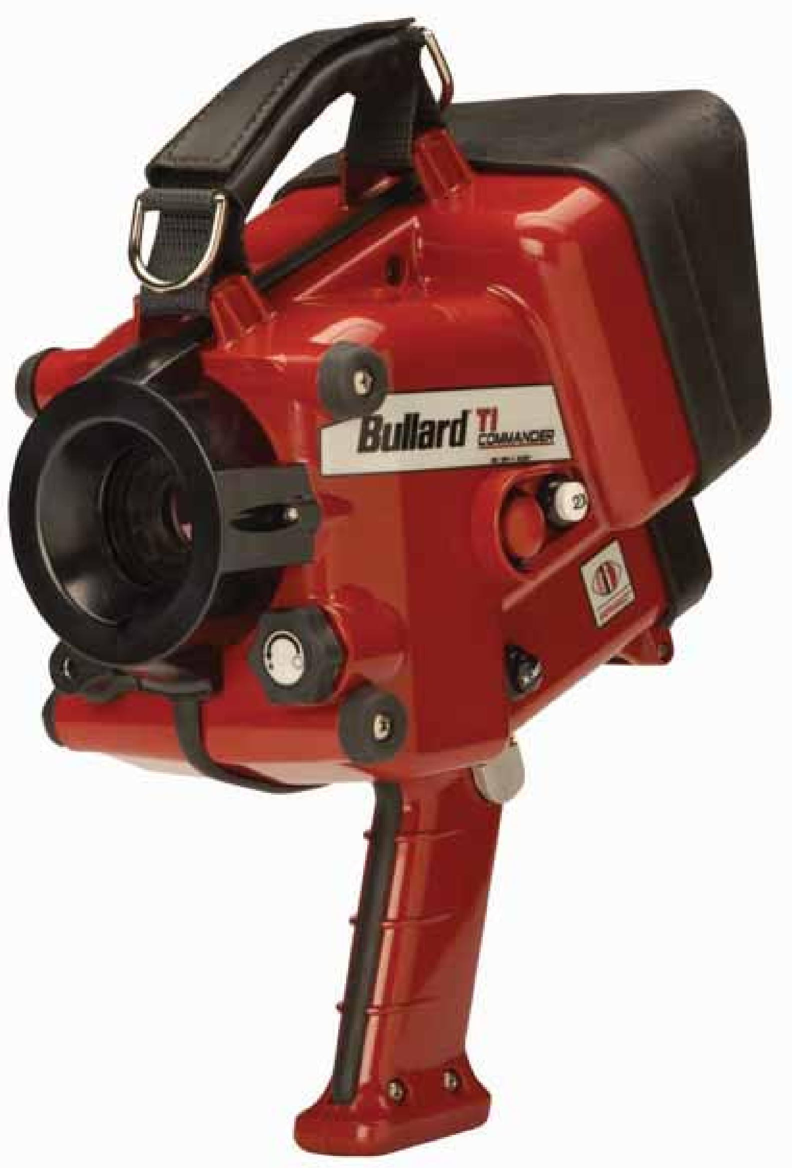

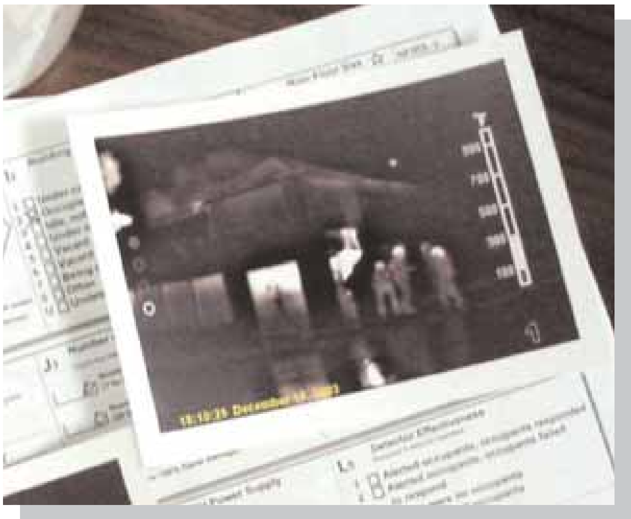

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An MDM PUBLICATION
Issue 11 – September 2004
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An Apology

In the last issue of APF we referenced the picture on page 16 as the F1 helmet from MSA Gallet. The helmet pictured was actually an MSA Gallet F2 helmet. Our apologies for this error.

APF Magazine

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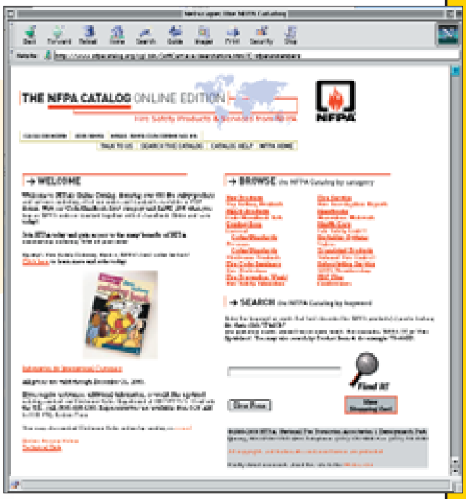

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FOREWORD

by Jeff Godfredson

NFPA's Asia-Pacific Operations Director

NFPA INTERNATIONAL

FIRE SAFETY IS AN OPTIONAL EXTRA

In the past few months there have been a large number of fatal fires; these have ranged from schools, school dormitories, nursing homes to name a few.

As a fire professional I am both horrified and not surprised by these outcomes. So much avoidable pain and suffering. We know the problems and we know the solutions.

When buildings are constructed we would think it outrageous if the plumbing and toilets were not installed and working and we would all agree it should be regulated and mandatory to have such facilities in modern buildings. Why then do we accept buildings with low or non-existent fire protection? I believe the community is of the belief that the government will require a sufficient level of fire safety to ensure that they are safe when they enter buildings.

If the buildings are safe why is it that we still see multiple fatality fires on a regular basis? The only answer is that there are many buildings out there that are unsafe. Who is responsible for this state of affairs? Many times I have heard the argument that the buildings complied at the time of construction therefore we cannot ask the owners to upgrade. Quite frankly I think this is nonsense. If on the basis of current knowledge and bitter experience we know certain types of buildings lack sufficient means to keep people safe they should be upgraded; or alternatively the public informed of the substandard conditions.

I am sure that many reading these comments are outraged that I should even suggest such a proposition. I would ask those who think I am wrong whether they would fly in an airplane with identified shortcomings which would risk their lives? In fact we do not leave such issues to the discretion of the airlines but produce laws, which require them to upgrade their planes. Why not upgrade existing buildings?

I guess fire safety is an optional extra.

Jeff Godfredson
NFPA's Asia-Pacific Operations Director

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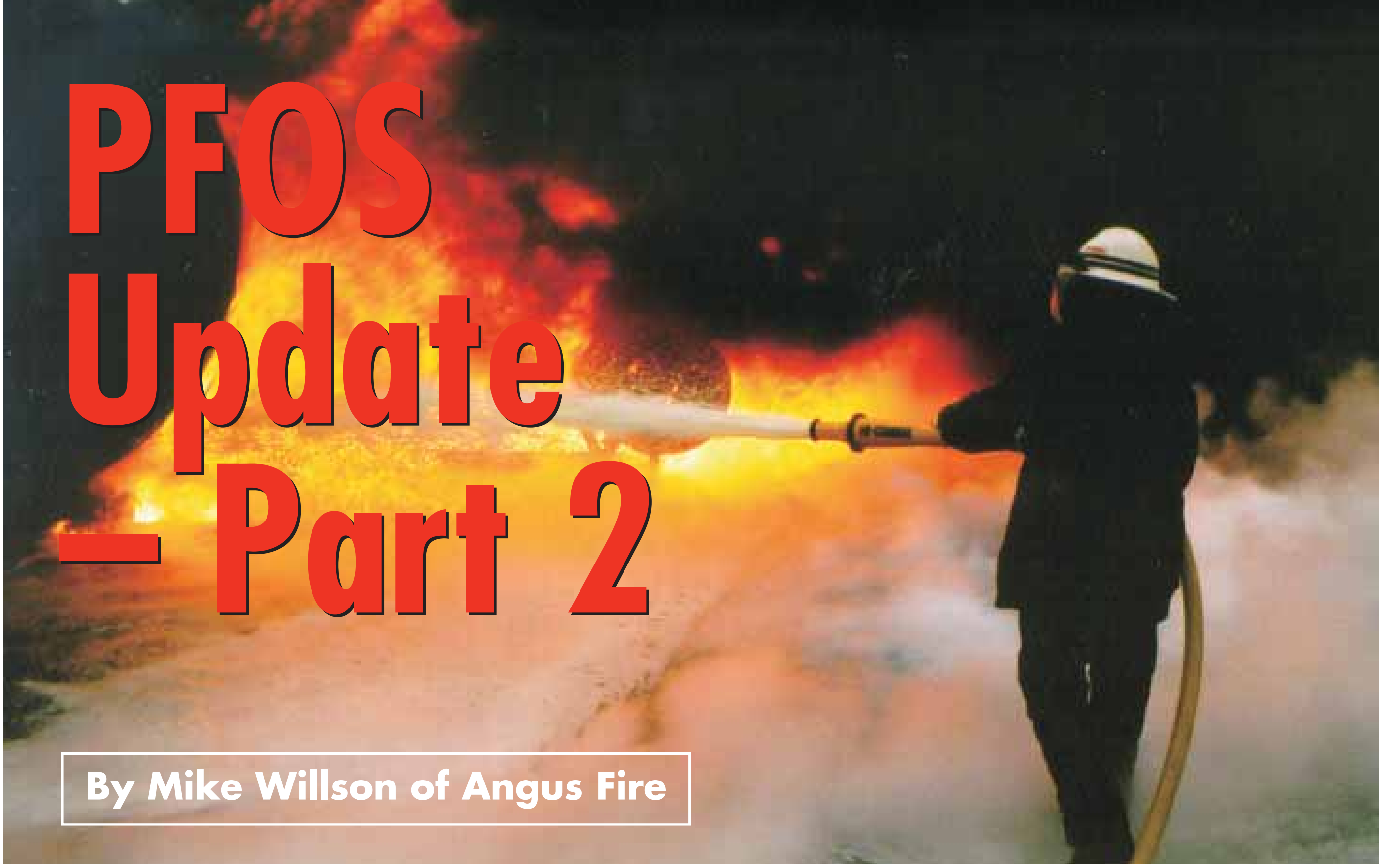
PFOS Update – Part 2



By Mike Willson of Angus Fire

The latest high performance Niagara foam from Angus Fire in action. Its polymer free multipurpose application gives fast knockdown on hydrocarbon and polar solvent fuels

Ed – Following on from his article in IFP Issue 17, here Mike Willson completes his PFOS Update. In this second part he will be looking at Telomer based products, Flurorine free products, modern product scores, hydrocarbon tank protection plus much more. To review part 1 logon to www.ifpmag.com

WHAT IS THE RIGHT FOAM?

What you need is the right foam(s) to protect your hazards through your specific application devices to ensure you are getting good value for money. This does not mean the cheapest foam as already described.

To determine this we need to start with deciding whether synthetic based or natural protein based products offer most benefits for your particular applications and facility. Choosing a manufacturer who produces foam by both methods is the most reliable way to get unbiased advise on this. An alternative is to contact a well known independent Consultant who specialises in this area, and works extensively in your particular sector of the fire industry, but they are also few and far between.

TELOMER BASED

Now lets look at the foam concentrate products themselves. There are several choices to be made here. Firstly we need to move away from PFOS or PFOA containing products and there are a wide number of cost-effective PFOS free and PFOA free protein based and synthetic based products to choose from. Telomer based PFOS-free fluorine containing foams typically use about ½ to ⅓ the quantity of fluorochemicals in 3M's branded products and are focussed on high performance, so are ideal candidates to replace any existing PFOS/PFOA containing foams.

FLUORINE-FREE

We are facing a rather bewildering rush of new foams and "foam-like" media entering the market, claiming much yet providing little evidence to substantiate their claims. Many of these fluorine-free products are simply re-packaged 40 year old wetting agent products designed primarily for forestry and Class A applications. They are not suited to Class B fire fighting. These agents are usually strong detergent chemicals and can be very toxic to the aquatic environment with 96 hour LC50 values of around 1ppm (part per million). They also kill water flea, the food of fish, putting them under even more pressure. Some are also only just considered readily biodegradeable with 60-65% over a 28 day biodegradeability test.

MODERN PRODUCTS SCORE

But there are some modern F3 products which do have some niche applications for Class B fuel applications, although generally they are not as robust or wide ranging in their fire performance capabilities as the telomer based products. Leading brands in this area are Syndura and RF6, and the F3 fluorine-free training foams like TF3, TF6 and TFAL3 which cleverly mimic the induction performance and foam properties of their frontline counterparts like Petroseal FFFP for aviation, FP70 Plus in the Oil sector and Alcoseal/Niagara the multipurpose Alcohol Resistant (AR) type foams, suitable for use on hydrocarbon and polar solvent fuels. Synthetic based products are similarly supported with Trainol to mimic regular AFFFs (Aqueous Film Forming Foam) and TFA 3 mimicing average viscosity AR-AFFFs .

Care is needed as there are some foams in this broad category which claim to be "fluorine-free" yet when

PFOS Update – Part 2

MEX Bund Pourers provide exceptionally stable yet fluid foam blanket for bund protection with natural protein based foams like FP70 Plus, Alcoseal and Niagara

anaylsed have a significant fluorine content so are effectively weak AFFFs! Others claim to be fluorosurfactant free, yet contain a fluorinated polymer within them. Clearly caution is required by the many users reviewing suitable replacements. They need to be cautious to ensure they are getting the product they really need and that does fulfil all their practical requirements.

HYDROCARBON TANK PROTECTION

Often 1x3 AR foams are being predominantly used for protecting bulk storage of hydrocarbon fuels. Without doubt the most efficient and cost-effective answer for this application lies in modern high performance FluoroProteins like FP70 Plus from Angus Fire. This foam achieves an amazing 272 points out of a maximum possible 300 in the LASTFIRE test for bulk tank applications, higher than virtually all the more expensive AR-AFFF foams.

1X3 AR-AFFF A FALSE ECONOMY?

Multi-purpose AR-AFFF type detergent based products are relatively thick concentrates with high polymer levels, making induction in winter difficult to achieve. This is especially the case for 1x3 products which are used at just 1% on hydrocarbons and 3% on polar solvents.

At 1% induction accuracy it is vitally important to be accurate not only at ambient summer temperatures above 20°C, but also at the minimum use winter temperature for the foam. Most of these AR-type polymer containing foam products are not suitable for use below +1.7°C. Even at these cool temperatures induction at 3% is a challenge for most portable inductors or fixed proportioning systems. When the claimed induction rate is reduced further to 1% it becomes very difficult to maintain induction of these shear-thinning polymeric foams to effective levels within the 1-1.25% tolerance band required by international standards like NFPA 11, BS EN 1568 and UL 162. It is difficult enough in summer, but just not practical in winter!

> *Multi-purpose AR-AFFF type detergent based products are relatively thick concentrates with high polymer levels, making induction in winter difficult to achieve. This is especially the case for 1x3 products which are used at just 1% on hydrocarbons and 3% on polar solvents.*

Do you really want to rely on a concentrate that will not induce properly in winter conditions? When fire strikes on a winter's day inducing these foams may only achieve 0.5% or less. There is therefore a risk that insufficient foam is mixed with the water to provide the fast control needed. It could even fail to achieve the objective, resulting in potential danger to life and/or significant financial losses as a consequence. Alternatively it may extinguish over such a prolonged period that the foam supply runs out before a stable foam blanket can be built up to ensure re-ignition does not occur. Water alone could then be delivered onto the fire, which could cause dangerous flare-ups and potentially major re-involvements. Inevitably if used in anger on a large fire these foams will often be used at 3% to gain the control needed, but of course the user is likely to have calculated his foam stocks on the basis of using it at just 1% for such an event. It is therefore quite likely that insufficient foam will be stored on site to achieve rapid extinction even though these products are significantly more expensive and potentially more harmful with higher fluorine contents than alternative 3x3 AR products. Anyone using such products would do well to consider holding larger stocks than full use at 1% would suggest, in case they need to use higher induction rates in an incident! If you are tempted down this route then check out the products available and compare their certificated LASTFIRE test performances. However there are probably better answers to consider as more effective solutions to your problems.

MODERN FPS ARE BEST

Modern FP foams like FP70 Plus are the only ones without viscous polymers that have passed the tough Lastfire test in all 3 application categories:

- forceful semi-aspirated “big gun” monitor nozzles with the highest test application rate of 4 litres/min/m^2
- forceful well aspirated “foam cannon” monitor nozzles at the lower application rate of 3.2 litres/min/m^2
- the more gentle system pourer nozzle which simulates a fixed foam top pouring system fitted to the tank with the lowest application rate of all at just 2.5 litres/min/m^2.

Realistic design application rates for real fire scenarios are normally about double these test rates, with fixed pourer systems normally calculated at 4.1 litres/min/m^2, forceful monitors on small tanks up to 18m dia at 6.5 litres/min/m^2 or where crude oil is involved 8.2 litres/min/m^2 and larger tanks of 45m to 110m dia at around 10-12.5 litres/min/m^2.

The leading FP brands like FP70 Plus are able to provide a stable, heat resistant low expansion foam blanket which tolerates forceful punging with the hydrocarbon fuel and yet exhibits minimal fuel pick-up into the foam blanket, unlike the detergent based AFFF and AR-AFFF types which are prone to emulsification with the fuel, resulting in reduced post-fire security of the protecting foam blanket. FP 70 Plus lasts longer and seals better against the red hot metal tank shell, and is among the most efficient uses of C6 telomer based fluorocarbon surfactants there is, in modern fire fighting.

HIDDEN PROBLEMS

The polymer in AR-AFFFs is designed to make standard AFFFs (invented for shallow aviation spill fires – not deep seated tank fires) behave more like the leading FP foams, but at significant extra cost. Other problems can be posed by these AR-AFFF products as some may suffer from potential logistical difficulties with induction accuracy – especially when used at 1% as discussed earlier. Much higher fluorine levels and premature ageing, where the polymer can sometimes drop out of solution and leave a jellified mass at the bottom of the drum or bulk tank, which is then liable to block induction devices. Should this separation occur,

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Protein foam liquids	FOAMOUSSE 3%, 6%
Fluor Protein foam liquid	FLUOR FOAMOUSSE 3%, 6%
Training foams	

Ask for more information.

Thomas Gaulke – FIRE Foto

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Fire Fighting Foams & Equipment

the foam is wrecked and needs immediate replacement. This can occur in high temperature storage or freeze– thaw cycling during a cold snap in winter conditions. These are possible problems that just do not occur with FP foams as there is no polymer present, and FPs have been shown to be very stable in a wide range of long term storage conditions, even under some of the harshest conditions on the planet.

If there are smaller hazards of polar solvent fuels on site, it would be worth considering a separate and preferably fixed automatic foam proportioning and delivery system for these specific areas, which uses a smaller quantity of the more expensive AR-FFFP orAR-AFFF type concentrate for these more complex fuels.

ALL-ROUND VERSATILITY SOLVES PROBLEMS OF MIXED RISKS

The second answer is most appropriate for varied applications where the balance of hydrocarbon and polar solvent hazards are equal or tipped towards more polar solvent inventory, and so called "mixed risks" where both fuel types are stored. In some instances like Municipal Fire & Rescue Services or Civil Defence organisations, fire-fighters frequently do not know exactly what grades of fuel are involved. In such cases they must assume that polar solvents may be present and so need a multi-purpose AR type product. In both these situations the most likely risk is a shallow spill fire in a road traffic accident, manufacturing process area, tanker loading bay or marine terminal area. Maximum product versatility from a multi-purpose AR type is therefore required to provide rapid control and extinction of any incident.

Easy year-round induction

The natural inclination of a foam user would therefore be to choose the ideal product for his mixture of hazards. A product that works well on both hydrocarbon and polar solvents would be a pre-requisite. A single 3% induction rate would be a distinct advantage as the correct proportioning rate is then always assured whether the hazard involves hydrocarbons and/or polar solvents, and there is enough safety margin that if the proportioners being used are not particularly accurate the product will still work effectively. This foam concentrate also needs to flows easily, preferably without those viscous polymers that could give proportioning or storage difficulties, even in a matter of months. It also needs to be useable year round and not freeze solid as soon as the ambient temperature drops much below freezing, an independent international approval for use down to –18°C would certainly amply fill that box with a tick!

Multiple applications

Such a product would also needs to resist hydrocarbon fuel pick-up well when applied forcefully and provide rapid control and extinction on both hydrocarbon and polar solvent fires, yet also offer good post-fire security from a preferably natural protein base material, which makes for a more robust bubble structure retaining water where it is needed on the surface of each bubble. It would need to be useable at Medium Expansion (MEX) for fast coverage of bunded areas surrounding storage tanks with a deep blanket which helps to minimise splashing

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and covers pipes, valves and flanges with a cooling foam blanket to prevent them getting hot from the flames, distorting and rapidly leaking more product which risks escalating the incident.

MEX foam is also valuable as a vapour suppressing agent for liquid spillages which have not yet ignited or for those which give off toxic vapours when released like Chlorine and Ammonium hydroxide. In some instances doubling the recommended induction rate can give a very stable and long lasting foam blanket for such situations. Additional versatility would also be useful, like the flexibility to be used through conventional "non-aspirated" (NAF) water nozzles for hydrocarbon fires aswell as the more conventional low expansion (LEX).

Extra Class A capability

Of particular benefit to Municipal Fire Departments would be for such a product to be useable as a wetting agent on Class A fires from as low as 0.2% and Compressed Air Foam Systems (CAFS) from 0.6% both up to 1%. The ability to also use it at just 1% on shallow hydrocarbon spill fires would also help the user to have a more cost-effective answer on smaller fires and allow effective training of the crews who are going to use it in anger on real fires. Does such a product exist that offers all this versatility with inherent reliability as well?

The most significant technological innovation in fire fighting foam circles for many years form the leaders in fire fighting foam technology achieves all these requirements. It is called Niagara, the totally polymer-free natural protein based AR-FFFP concentrate suitable for use down to –18°C and meets all the above requirements. Its unique chemical formulation offers all mixed risk

> *MEX foam is also valuable as a vapour suppressing agent for liquid spillages which have not yet ignited or for those which give off toxic vapours when released like Chlorine and Ammonium hydroxide.*

Care for the Environment

Careful selection of ingredients has enabled products like Niagara to have low environmental impact when released into the environment with low aquatic toxicity levels (96 hour LC50 values on Rainbow trout of just 2,830ppm -several times less toxic than many AR-AFFF types) and 95% biodegradeability over the 28 day test period. The natural base material also ably assists this exceptional environmental performance, which shows significant improvements over more conventional synthetic detergent based wetting agents and AR-AFFFs, where the detergent base alone is quite highly toxic to aquatic organisms.

Climatic conditions are not a problem either, since it is the world's first multi-purpose AR type foam with independent UL 162 approval for use from +49°C down to –18°C, ensuring it is ready for action so you achieve highly effective and versatile fire fighting all year round.

WHY NOT DO YOUR OWN REVIEW?

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1st Announcment

FDIC FESA
Fire & Emergency Services Asia 2005

Theme: The New Threat Environment: Protecting the Community
Civil Defence Academy (HOT Sessions)
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Feb 22 – Feb 26, 2005

5 Days of Conference, Exhibitions, & Hands-On-Training (HOT) Sessions!

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3 DAYS OF CONFERENCE & EXHIBITIONS

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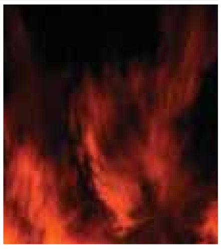

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Jump-startin

Pic courtesy of ALERT Disaster Control

New 3M Foam Technology Proves Worth in Real-World Emergencies

EVEN AS AN EAGERLY-AWAITED alcohol-resistant version is being prepared for commercial launch later this year, rounding out 3M's new line of fluorochemical-free Class-B firefighting foams, the first of these products have been on the job – and proving themselves in the heat of battle – long before the official ceremonies were slated to begin.

These new products, sold under the brand name, 3M™ RF-Series Fire Fighting Foam Concentrates, are based on an innovative technology that uses no fluorochemical surfactants, but still provides excellent protection against flammable liquid fires and spills.

Chizzy Nnamchi, Business Development Manager – Oil & Gas Center, 3M Asia Pacific, explains that much of the initial demand for the new products is being driven by their successful performance in real-world emergency situations.

"Fire professionals have been under increasing pressure to consider the environmental issues surrounding their use of firefighting foams," he said. "That's why there has been so much interest surrounding our new 3M RF-Series foams, which have been shown to be readily biodegradable, and are not identified with any persistent or bio-accumulative ingredients." Even so, when 3M first began testing these products, Nnamchi found that many people were skeptical that a non-fluorochemical formulation could deliver the kind of extinguishing and securing performance they were accustomed to with high-quality AFFFs. "Once RF foams began to prove themselves in actual emergencies, however, these doubts were erased."

3M RF-series foams have been witnessed by Det Norske Veritas(DNV), to meet and exceed a number of critical international standards, including the rigid ICAO Level-B specification and CEN/EN-1568 requirements for extinguishing and securing performance. It is the only non-fluorocarbon-based foam concentrate witnessed to meet the ICAO Level-B fire performance rating.

According to Ted Schaefer, a chemist with 3M Australia who led the team that developed the new 3M RF-Series foam technology, these foams use a different extinguishing and securing mechanism than AFFFs or fluoroprotein foams. Even so, he maintains, firefighters should notice little difference in their application or performance.

"The new 3M RF-Series foams move rapidly over the surface of hydrocarbon liquids, providing fast extinguishment and effective vapour suppression. The long-lasting, self-healing foam blanket produced has excellent heat resistance, and will stick to hot metal surfaces." He went on to say that 3M RF-series foams are effective in most conventional fixed and portable foam equipment and systems, and are compatible with dry chemical agents.

Those assertions were put to the test in September, 2003, when a refinery operated by one of Japan's largest oil production companies was rocked by a powerful earthquake, damaging the integrity of more than 40 petroleum storage tanks on the property and igniting fires in two of the tanks: one containing crude oil, the other containing naphtha. As the call went out for emergency stocks of foam to be brought in, firefighters at the refinery used their existing stocks of fluoroprotein foam to battle the blaze, depleting their inventory in the process. In the meantime, volatile vapours escaping from the sunken roofs of the unignited tanks were creating the potential for an even larger disaster. ALERT Disaster Control mobilized in excess eight heavy lift aircraft load of emergency response equipment inclusive of 3M RF-3 foam stock in support of the customer requirements, which played an important role in the post-extinguishment suppression effort of these vulnerable tanks, particularly those adjacent to a power station that serves both the refinery and the nearby community.

3M RF-Series foams were the only foam products used by ALERT Disaster Control to successfully control a large wellsite fire located in the southern part of Uzbekistan, near Afghanistan in late 2003. The well blowout began spewing a stream of crude oil that quickly spread out of control and later ignited, creating a virtual lake of fire that engulfed the entire wellsite. ALERT were contracted to lead the oilfield firefighting and well control operations. Their teams used approximately 40 drums of RF-3 foam to control and extinguish the

> *The new 3M RF-Series foams move rapidly over the surface of hydrocarbon liquids, providing fast extinguishment and effective vapour suppression. The long-lasting, self-healing foam blanket produced has excellent heat resistance, and will stick to hot metal surfaces.*

g innovation

pooled hydrocarbon fires surrounding the well site. Another 14 drums were used for vapour control during the lead up to capping of the well. According to Michael Sorenson, ALERT Business Development Manager (Fire & Safety Products), "The 3M RF-3 product performed as well as, or better than, a high-quality AFFF."

In 2002, the New Zealand Refining Company's Marsden Refinery, operated as a joint venture between BP, Mobil Oil NZ, Caltex NZ and Shell NZ, conducted an extensive research project, comparing 3M RF-series foam with one of the best-selling fluoroprotein foams. The purpose of the research was to determine whether a non-fluorochemical alternative would perform as well as, or better than the fluoroprotein foam, while offering a lower impact on the environment.

The results of this research, which included full-scale tests through conventional foam application equipment, showed conclusively that 3M RF-3 foam offered better extinguishing performance, equipment compatibility and flexibility than the conventional fluoroprotein foam tested. The refinery has now standardized on 3M RF-3 foam throughout the facility, maintaining an inventory of some 40,000 litres on-site.

Having experienced the capabilities of the new 3M RF-Series foams firsthand, ALERT Disaster Control has committed to using 3M RF-Series foams in their flammable liquid firefighting operations following a preferred channel partner agreement signed with 3M in July this year. ALERT Disaster Control's services include oilwell firefighting and blowout control (for example, ALERT's teams were involved in the successful control of numerous massive oilwell fires in Kuwait during the first Gulf War); marine and industrial firefighting; risk management; and training. The company serves clients throughout the world from their corporate base of operations in the Republic of Singapore (Asia) and throughout the ALERT group of companies located in Calgary (Canada), Houston (USA), Dubai (Middle East) and Brisbane (Oceania).

Pic courtesy of ALERT Disaster Control

Pic courtesy of ALERT Disaster Control

The use of 3M RF-Series foams has not been confined to industrial firefighters or, indeed, to Class-B hazards. According to Marino Mystegniotis of 3M Australia, municipal and rural fire brigades in Queensland, Southern Australia. Northern Territory and Australian Capital Territory have adopted 3M RF-3 foam for use against transportation emergencies, bush fires and even for training purposes. Rural fire brigades in Tasmania, New South Wales and Victoria are currently evaluating 3M RF-3 and 3M anticipates their involvement shortly. "By improving the wetting and penetrating properties of water, 3M RF-3 foam provides superior extinguishment of Class-A fires involving furnishings, wood, rubbers and plastics," he explained. "And there are fewer issues with disposal of spent product, because it is low in toxicity to tested aquatic organisms (including algae, crustatians and trout), and can be successfully treated in biological wastewater treatment systems."

The growing market acceptance of 3M RF-Series foams among firefighters, insurers, equipment manufacturers and end users comes as no surprise to 3M's Nnamchi, who points out that 3M has a long tradition of innovation in flammable liquid fire protection. In fact, he says, this tradition dates back to the 1960s, when the company worked with the U.S. Navy to develop the first aqueous film-forming foams (AFFFs), and continues to this day.

"Since the year 2000, when 3M announced it was discontinuing the manufacture of certain classes of fluorochemicals – including those used in formulating 3M™ Light Water™ Foam products – we have been working hard to develop alternative chemistries that would offer our customers a more favorable balance of performance and environmental properties," he explained.

Nnamchi went on to say, however, that a foam's ability to put out fires while minimising its impact on the environment is just one element affecting its success in the marketplace. "Light Water became the world's premier brand of foam products, not only because of its performance, but because of the extensive emergency response network that was developed to support its users in the oil and gas, aviation, marine and other industries. Today, we are committed to providing that same level of support to users of 3M RF-Series products." He explained that this support is manifested in a variety of ways, including rapid deployment of emergency foam stocks; coordinating response efforts with partnering companies such as ALERT Disaster Control; periodic foam testing services; technical support; and training.

Currently, 3M RF-Series foams are available as either a 3% or a 6% concentrate. Both are suitable for hydrocarbons and some partially water-soluble fuels, such as blended gasohols, as well as Class-A hazards. A new alcohol-type concentrate designed for both hydrocarbon and polar solvent hazards, 3M™ RF-AR, is scheduled for commercial release this October .

Other 3M fire protection products include 3M™ Fire-Brake Bushfire Fighting Foam; 3M™ Super Concentrate Training Foam; 3M™ Hi-Ex Foam, for use in confined spaces such as mine shafts and ship holds; and 3M™ Novec™ 1230 Fire Protection Fluid, a low global-warming clean agent alternative to halons.

For more information on
3M RF-Series foams, contact:

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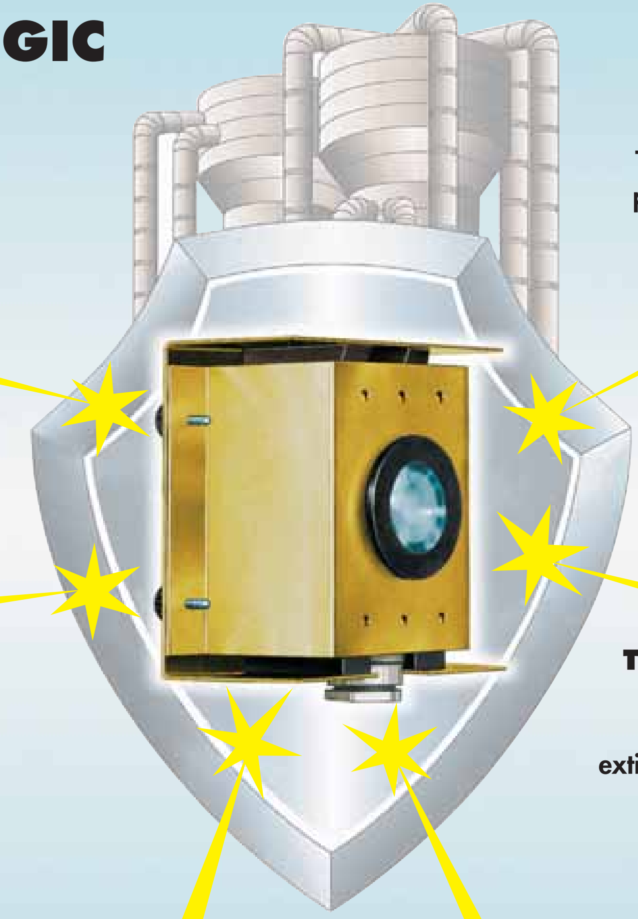

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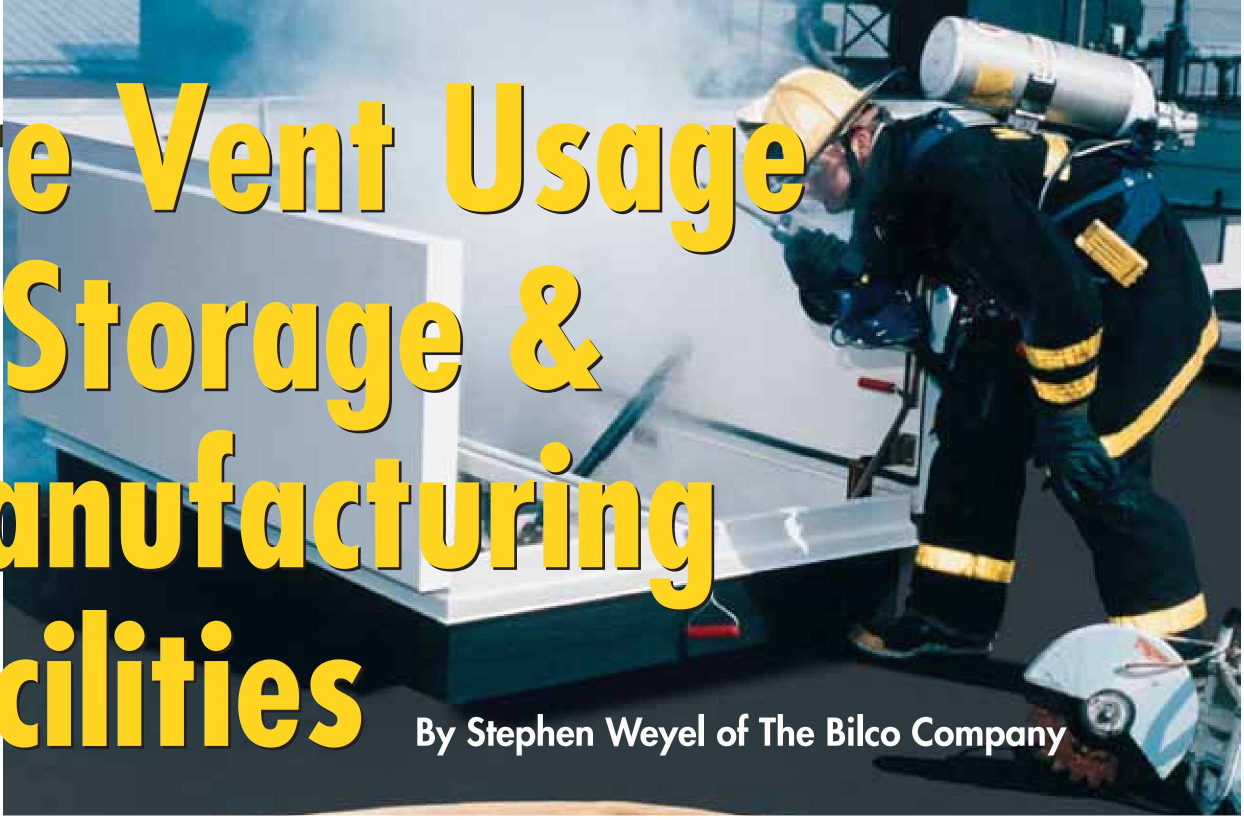
Fire Vent Usage in Storage & Manufacturing Facilities

By Stephen Weyel of The Bilco Company



One advantage to fire venting is the fire department's ability to quickly find a fire's source and attack it from directly overhead

A BUILDING'S LEVEL OF fire protection and preparedness holds the highest level of importance for the safety of the personnel and property within. Therefore, it is essential for architects, specifiers, and building owners to understand the different fire protection products available, how they are designed to function in an emergency, and how to use them to best protect a building. One of the options for fire and life safety is automatic fire vents. This article will explore the purpose, history, construction, use, and maintenance of fire vents, as well as explain the applications in which these products can be used to the greatest effect.

THE BASICS

Fire vents are designed to maximize fire containment and life safety and minimize damage and material loss. Use of these vents is not just a wise idea; it is a building code requirement in many countries. Similar to a roof hatch, vents are installed on a building's roof and are available in single and double leaf models. However, the difference between these products lies in their function.

Fire vents are designed to open automatically in the event of a fire, and they offer a variety of proven advantages. They improve visibility inside the building to help occupants escape the fire and reduce the risk of smoke inhalation. Further, on a large structure with many vents, open vents indicate the precise location of the fire to firefighters. This saves valuable time and allows firefighters to fight the fire more safely and efficiently. Fire vents also have a tendency to restrict the spread of fire across the floor based on the "zone theory" of venting. This theory holds that the hot gases and flame produced in a fire rise upward, entraining air, and spread outward in a layer on the ceiling. This layer of heat is trapped by the layer of air underneath, because the air's density is higher. When the layers spread to cover the whole ceiling, they deepen. Venting is designed to cycle hot gases from the fire layer out as more are produced, keeping the layer from spreading and deepening.

HISTORY OF FIRE VENTS

Fire vents were originally developed in the wake of a terrible tragedy. On August 12, 1953, General Motors' Livonia, Michigan Hydra-Matic transmission plant caught fire when a cutting torch ignited a drip pan containing rust inhibitor. The factory was new and state-of-the-art in design, and considered by many the finest plant built since the end of World War 11. Within 20 minutes, the 1.5 million square foot building was nearly destroyed. There were few injuries and fatalities; however, the plant incurred approximately $80 million in damage.

Following the fire, standards for fire protection and life and material safety were brought to the forefront as many speculated that fire protection products could have saved the plant. Companies began to introduce fire vents shortly thereafter to glowing reviews by many in the fire protection and industrial communities.

WHERE TO USE FIRE VENTS

While fire vents are used in many countries throughout the world, each country has its own requirements regarding the use of fire vents and other fire protection products. Local and

Automatic testing of a fire vent requires a heat source to melt a 74°C (165°F) fusible link located in the vent's latching mechanism. Once the automatic operation test is complete, the fusible link must be replaced and the latching mechanism reset per the vent manufacturer's instructions

Manual fire vent testing involves simply pulling both the interior and exterior pull release cables

national fire codes dictate the products used (including sprinkler systems, alarms, and the number and size of automatic fire vents). Building type also plays an important role in the selection of fire protection products. While there are many types of buildings, automatic fire vents are ideally suited for buildings with large expanses of unobstructed space, such as auditoriums, retail stores, manufacturing facilities, factories, warehouses, and convention centers.

When determining the fire protection products for these types of buildings, the content of the building must also be considered. The International Code Council, authors of the International Residential Code and International Fire Code (both utilized in the United States), categorizes buildings based on the levels of flammability and combustibility of goods within them. Group F1 is a moderate-hazard factory and manufacturing classification. It includes buildings that produce and store items such as millwork, wood products, metal, machinery, and furniture. Group S1 is a moderate-hazard storage and warehousing classification. It includes facilities which house items of varying flammability and combustion levels such as lumber, aerosols, bags, cardboard, and certain lubricating oils.

In 2000, two new building categories were added to this list, hazardous storage facilities (Group H) and high-piled storage facilities. Group H buildings are broken into four subcategories, H1 through H4. Group H1 items include explosives, organic peroxides, and detonable pyrophoric materials. Group H2 items include flammable gases, combustible dusts, oxidizers, and water-reactive materials. H3 items include Class I, II, and IIIA flammable and combustible liquids, flammable solids, and combustible fibers. The H4 Group includes corrosives, toxic and highly toxic materials. The high-piled combustible storage category was designed to address a modern warehousing concern. New, tall storage rack systems within storage facilities are designed to maximize useable space. This is functional but risky, as flammable products are stored in pallets in a tight array. These shelving units have a concentrated load mass and are more likely to ignite and spread fire quickly.

MAINTAINING FIRE VENTS

Proper maintenance and testing is a vital component to the reliable functioning of automatic fire vents. The manufacturer's operation and maintenance instructions must be followed to ensure that the vents will open properly in an emergency situation. In general, manufacturers typically recommend that fire vents be manually and automatically tested once a year. In both cases, the vent covers should move easily and lock in the full open position. Manual testing involves simply pulling both the interior and exterior pull release cables. Automatic testing of the vent requires a heat source to melt a 74°C (165°F) fusible link located in the vent's latching mechanism. Once the automatic operation test is complete, the fusible link must be replaced and the latching mechanism reset per the vent manufacturer's instructions.

Some fire vent models, such as this, are designed with translucent covers; thereby increasing the vent's functionality since it doubles as a skylight

In addition to testing, fire vents also require some general maintenance. As is the case with any mechanical device, regular lubrication of all pivoting joints, latches, and moving components is recommended. Depending upon the vent material, the exterior finish may also require maintenance to guard against damage from direct exposure to the elements. Vents constructed of steel may require periodic painting. When painting, it is important to take extra care to avoid paint buildup on or near the fusible link and pivoting components, as buildup can affect vent operation.

FIRE VENT OPTIONS

There are a number of styles and options available for automatic fire vents. Vents can be supplied with translucent covers to add natural daylight into a building. Vents can also be modified for electric activation from building's fire alarm control panel and motorized for daily operation and ventilation in manufacturing facilities. Vent manufacturers also offer specialty vents with an explosion release mechanism. In the event of an internal building explosion, these vents open automatically to relieve pressure, thereby helping to preserve the building's structure. If building security is a concern, fire vents can be supplied with security grilles to protect the opening from unauthorized access.

Fire vents are one of several fire protection options that can be incorporated into a building design. While they are used differently throughout the world, they offer proven fire protection advantages that should be considered architects, specifiers, and building owners.

Stephen Weyel has been with The Bilco Company for over 20 years and he currently serves as advertising and marketing support manager. Stephen can be reached at (203) 934 6363 or via standard mail at P.O. Box 1203, New Haven, CT 06505. For more information on The Bilco Company, visit www.bilco.com

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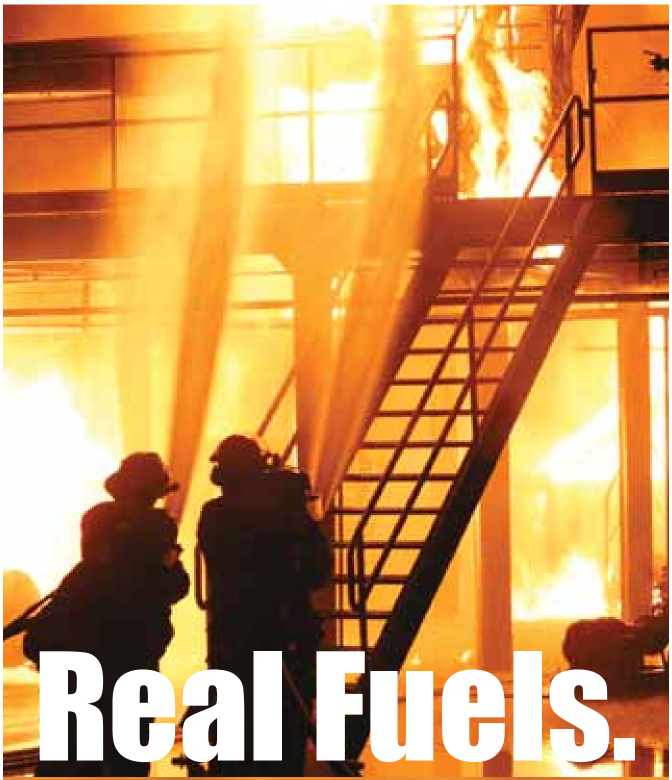

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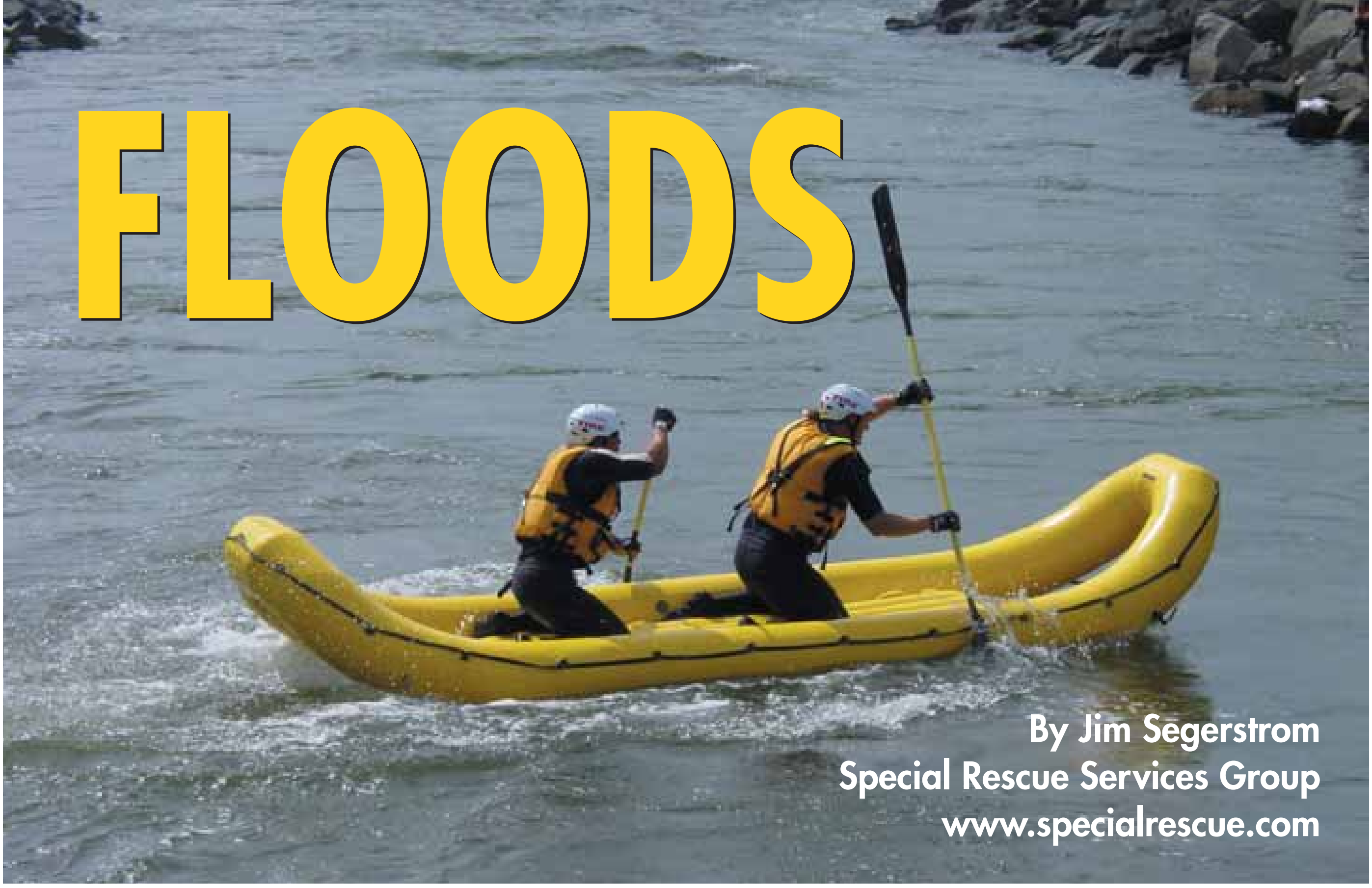

FLOODS

By Jim Segerstrom
Special Rescue Services Group
www.specialrescue.com

Pic courtesy of Jim Segerstrom, Special Rescue Services Group

The TRUE "Terrorist" Threat of the 21st Century

Floods: A Growing Global Pandemic

AS I WRITE THIS 5 million people are fleeing from the east coast of Florida, moving north and west, evacuating ahead of what some experts predict will be a storm twice as severe as Hurricane Charley, and probably worse even than Hurricane Camille, which devastated the east coast of the United States in 1969. The United States has now suffered the worst flooding of any summer in recorded history. From Boston to Charleston, rescue agencies have conducted hundreds of flood rescues in the last three weeks alone. Yesterday, four people were rescued from a bus in Richmond, Virginia, after being washed away and trapped for nearly four hours. Richmond area firefighters also rescued nearly 200 others as well.

In Florida, officials reminded those staying in place that more victims drown in inland flooding than are killed by the wind in hurricanes and typhoons.

Last week I was in Japan, conducting Flood Management courses for officials, when Typhoon Chaba came ashore, killing 10 overnight, and leaving thousands trapped with no power or fresh water. This typhoon was the 17th of the season. Normally, the 17th storm is nearly at the end of the season, two months away. The number and severity of typhoons in the eastern Pacific is on a steady rise each year.

The world in which our children will raise their families will be a very different place. And current "disaster management" systems are not adequately organized to meet the challenges.

The planet is warming, and with that warming will come unpredictable weather patterns featuring long periods of drought and short periods of violent storms and flooding. United Nations studies indicate that by 2030 major flood disasters will significantly impact nearly 100 million people each year. The world's oceans will rise in the same period nearly ½ meter.

The changes have already started. The number of catastrophic global floods has risen steadily since 1999, reaching over 150 in 2003. The summer of 2002 was the wettest in northern Europe in over 500 years, and the summer of 2003 was the hottest in recorded history. The polar ice caps are melting, and are changing the temperatures of the currents in the Atlantic, and causing longer El Ninos in the Pacific. The western United States is now experiencing the largest wild land fires in history on a depressingly regular basis. East Asia floods forced the evacuation of over 7 million in India and Bangladesh in a 3-week period in August. The number of typhoons in the eastern Pacific has already exceeded the number that occurs in an average full season. Several thousand have died throughout Asia and South America. In the United States nearly 150 have been killed in floods since January 2004. Mud slides and debris flows have killed nearly 100 in Japan and Taiwan in the month of August alone. In one case in Taiwan, an entire village vanished in 10 seconds, killing 15 and leaving nearly 30 missing. In Indonesia, (photo above) massive mud slides and debris flows destroyed entire villages, killing hundreds. And seasonal floods in east Africa continue to displace hundreds of thousands while requiring massive humanitarian rescue efforts in the bargain.

Globally emergency managers are faced with the greatest credibility problem they have had since the conception of "civil defense" nearly 100 years ago. While concentrating billions of dollars on preparations for terrorism and weapons of mass destruction, (for which terrorists are paying as little as $50,000 per event to commit,) many governments continue to simply react to the growing enormity of weather-related events.

I had the honor to speak at the International Technical Rescue Conference in

Pic courtesy of Jim Segerstrom, Special Rescue Services Group

England in 2002. One of the other speakers was a high-ranking member of Britain's counter-intelligence system, tasked with dealing with the growing terrorist threat. At the conclusion of the conference the question was posed to him: "What will be the next big strike by the global terrorist network?" His answer was disturbing. He felt that intelligence was inexact, but that it would likely be a "low tech" attack, in an "low-risk" geographic area, designed to de-stabilize divisions of government, and for which current preparations would again prove to be mis-directed and inadequate.

A month later came the attack against the train system in Madrid, using simple bombs placed in backpacks, and which caused the fall of the Spanish government, and the withdrawal of their troops from Iraq. As this is being written terrorists used women, who obviously didn't fit the "profiles," to smuggle bombs through the lax security system in Russia and destroy two small airliners. And just a few weeks ago a sudden storm surge combined with inland flooding to devastate a small village in Cornwall, pushing rescuers to perform tasks for which they were neither trained nor equipped.

Recently, officials whose names were omitted on request told the *Sunday New York Times* that there was a very good chance that terrorists could set off a "dirty" bomb in the US. Security of radioactive waste was rated as poor to abysmal, and the amount being spent on that security had no increased at all since 9-11.

In short, while our collective eye is on terrorism, global flooding is killing hundreds of thousands each year. Governments, many on the Pacific Rim and in Asia, are woefully unprepared for the coming storms.

Yet, of all major disasters flooding is the one that is most predictable. Floods ALWAYS occur in four distinct phases, and the events in each phase virtually always parallel all other floods. So instead of simply reacting to events, emergency services have the unique opportunity – at least in this one case – of getting and staying AHEAD of the problems, an opportunity for which they rarely take advantage.

In the US, storms Camille, Floyd, Isabelle, Charley and Frances, spread out over nearly 40 years, have FINALLY affected the behavior of emergency managers. For Frances, emergency flood rescue teams were pre-positioned in the state ahead of the storm, bringing them from as far away as Kentucky. The National Guard was mobilized and set up in "task forces" with swiftwater and USAR teams. And, most importantly, mandatory evacuations worked, moving most of the population out of the way.

As the result, while the property damage in Florida was severe, the loss of life was small. That good news was quickly being overshadowed by the news that Ivan, an equally powerful storm was building in the South Atlantic.

REPEATING THE LESSONS OF THE PAST?

Disaster management officials around the world could take heed of the simple lessons of these three events. If past history is any indicator they are likely not to do so, even though those same experiences have been repeated endlessly, and are occurring even more often now. Those lessons:

1. Terrorist attacks will continue to be inexpensive, but create costs thousands of times higher as governments try to prevent events, which the terrorists will likely not repeat!
2. In the short time between the attacks in Spain and the recent attacks on the planes in Russia and the taking of the school children hostages in that same country, floods killed nearly 25,000 people worldwide.
3. The events in Spain validated the need to pre-plan for generic disaster response, rather than specific events. Using a high degree of organization, Spanish authorities quickly and effectively dealt with the injured, and likely saved lives because of their preparations.
4. "Emergency management" is less of a profession and more of an appointment. Those who are given responsibilities should be those with the most substantial personal, professional and educational experience, rather than those moving within political systems. Sound judgment is a combination of a reluctance to repeat personal bad experiences, combined with the benefit of the bad experiences of others – the latter gained through professional association and advanced emergency management professional courses.
5. Government doesn't manage disasters. Disasters manage us. Governments REACT to disasters. Public education, and preparation are the keys to saving lives. Utilizing past experiences, thorough training, and regular practice, government can theoretically stay ahead of events. However those items are expensive, and therefore unpopular.
6. The number of rescuers being put in harms way, or dying during disaster response is rising. Compelled by circumstances to do something, they routinely "overcome, adapt, and improvise." Sadly – for the cause of increasing professional response – they generally succeed, further validating the impression of leaders and civilians that they will continue to do so, regardless of the dangers.
7. "Situational awareness," as a subject, is not taught to emergency responders. They generally are not trained to recognize that increasing senses of urgency, strained radio traffic, deviating from the plan, and yelling by officials at emergency scenes are all signs that something very bad is likely to happen soon. Urgency and emotion are not management tools and are reflective of inadequate preparation for unfolding emergency events.
8. There is a glaring need for not only a global agreement on methods of management of disasters, but even local jurisdictions continue to promulgate their individual "systems" as superior. As the result, "management" of the actual disaster continues to fragmented and less effective.

In short, we will likely win the war on terrorism but at the cost of losing the war against time; time to prepare for the increasing number of natural disasters. And, as the title of this article implies, "disaster management" may increasingly become an oxymoron.

THE CURRENT PROBLEMS

1. Floods are the "Weapon of Mass Destruction, but effective management of floods remains a low priority within most public safety agencies. There are four distinct and identifiable phases to a flood, and the emergency concerns within each remain virtually the same from event to event. This similarity gives emergency officials the unique ability to remain AHEAD of events, rather than

Pic courtesy of Jim Segerstrom, Special Rescue Services Group

simply reacting to events. Since most emergency managers have little idea of what those phases or concerns are, they continue to react, and civilians continue to die.

2 In my initial dealings with many public safety agencies I am struck by their insistence that nobody else shares their flood problems. There is nothing unique, special or different about floods, regardless of where they occur, particularly in Asia.

3 Starting with the FEMA U.S.A.R. Task Force system, there has a been a world-wide growth in "International Rescue Teams." As of 2004 the concept remains unproven, and, indeed, in the United States there has not been a single "save" as the result of the deployment of a Federally activated USAR task force. The total "saves" in overseas deployments has been less than a dozen. While the riposte, "how much is a live worth" may justify this extravagance, the reality is that the concept of deploying highly trained and heavily equipped disaster teams to incidents more than one day's travel away has not worked.

I have been involved in several training missions involving rescue personnel in Asia. We have hosted fact-finding missions from China and India here in California. We have had rescuers from China, Taiwan, Malaysia and Japan both come to California, and we have sent training teams to those countries. I have spoken on Flood Management on several occasions to officials of the Beijing City Government; the 2008 Beijing Olympic Committee, the Chinese Fire and Earthquake Bureaus, the Taiwanese National Fire Administration, Japan's Diet Committee on Disaster and the Japanese Ministry of Land, Transportation and Infrastructure.

USAR training, and the developments in equipment that have come with it, have proven their worth, however, since they have improved the capabilities of local organizations. FEMA and adherents of the USAR concept are currently re-working the concept – working to create smaller, more compact, "light task forces" that are capable of responding to floods particularly. The last 13 years have confirmed that there will always be more flood "jobs" than building collapses and terrorist attacks.

The fact remains that more lives are saved by the locals, immediately after the impact of the disaster, whether trained or untrained, than by international disaster agencies. So it should be evident that providing base-level rescue training and standardized command and control systems as far out into the community as possible, in the form of local volunteer rescue teams, coordinated and trained by regional officials, is the best formula for saving lives. More sophisticated rescue units are definitely worthwhile, but are expensive to train, staff, equip, and maintain. They are best pre-positioned close to the potential flood impact area, so that they can quickly be moved as needed, rather than waiting hours or days for them to mobilize and be transported.

Yet, despite all of those arguments, virtually the first and

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Pic courtesy of Jim Segerstrom, Special Rescue Services Group

only thing Asian rescue officials wish to find out about is how to create a USAR Task Force for their country!

4 As already mentioned, the absence of a generic system for incident command, primarily because virtually every agency wants to be in charge definitely hinders emergency response to disasters. There is a compelling need to develop a minimum standard for incident command on a global scale. One of the common features of international disaster responses is the inability of arriving agencies to adequately coordinate with local officials. The Incident Command System provides an excellent model for such a solution – since it designed to expand or contract as needed, and assures that local agencies can remain in control of their incident unless or until they wish to pass the authority on.

5 Since there is nothing unique, special, or different about floods, there should not be anything in the way of creating a "typing" system for resources – people and equipment. The greatest difficulty manager's face is determining how to effectively utilize assets during the disaster response. How are the equipped? What training do they have? How long can they deploy?

One of the positive aspects of the development of the USAR system has been that these task forces are designed to be virtually identical in composition for equipment and personnel, and United Nations members participating in international disaster deployment have universally adapted the model.

But the concept needs to be extended to the regional level for other disciplines besides USAR. In California the Swiftwater/Flood Rescue Committee of the Special Operations Division of the California Office of Emergency Services spent nearly 3 years to create a "typing" structure for swiftwater and flood rescue resources, as well as training requirements necessary for typing. Validated by FIRESCOPE, the typing is now included in California's Field Operations Guide – which is a required part of the State Emergency Management System – and has become the model for similar systems in Texas and other states.

THE INCIDENT COMMAND SYSTEM – THE START OF THE SOLUTION

The Incident Command System – started originally as a way to manage large numbers of personnel during wild land fires in California, has become THE largest generic management system of its kind, used by agencies globally in many different countries. It is ideal for incidents involving large numbers of organizations, sometimes working in unknown areas, and is designed to be expanded or contracted, depending on the size of the "incident."

Particularly in North America "ICS" has been adopted by most states and provinces, and is in common usage by military units, civilian agencies, rescue department, and even by private companies, as a way of aiding organization at all kinds of rescue and disaster incidents, large and small, and coordinating those responses.

ICS has proven ideal as well as a management tool for large-scale events. An "event" is something that is planned, while an "incident" is unplanned. ICS has been used in the US for the last two Olympic Games, and is being used as this is written to handle the projected difficulties of the Republican National Convention in New York City, where hundreds of thousands of protesters are expected to march in opposition to the Bush Administration and its policies in Iraq.

ICS is the key component not only in state emergency systems, such as California's State Emergency Management System – which is required learning for all volunteer and state rescue workers in the state – but has become the cornerstone of the United State's National Inter-agency Incident Management System.

It provides a logical basis for expansion into a world-wide emergency management system.

SWIFTWATER/FLOOD RESCUE TRAINING – THE SECOND PART OF THE SOLUTION

There were a significant number of deaths among rescuers in the early 1970s, all involving failed river rescues. Police and firefighters repeatedly lost their lives, trying to save victims trapped in moving water in a wide variety of situations, all of which responders were neither trained or equipped to deal with. As the result there was a concerted effort among concerned authorities and the private sector in the US, to try to coordinate education and training. In the eastern US, the River Safety Task Force of the American Canoe Association and the American Whitewater Affiliation started educating boaters as to the risks; while the Ohio Department of Natural Resources established the first training for state responders.

In California, several of us who were whitewater guides and members of the local Sheriff's Rescue Team, started delivering internal training, which was later identified by the community college system and the California State Fire Marshal as valuable training for other similarly tasked agencies. Three of us established a private concern, Rescue 3, to provide what we called "swiftwater" rescue training, the first use of the descriptor. We chose "swiftwater" because we were concerned with safety and rescue anywhere that water could move down a gradient, not just in rivers.

First the United States Lifesaving Association, and then the International Rescue Instructors Alliance, (Association in the United States,) certified the Swiftwater Rescue Technician program from 1979 to 2000. The IRIA continues to certify the new Swiftwater/Flood Rescue Technician program globally. The SRT and SFRT courses have been taught in 11 countries in seven languages, to thousands of responders. Additionally, the concept has fostered numerous other "swiftwater rescue" programs among fire and rescue groups worldwide.

The SFRT program is grounded on the premise that the basics of swiftwater rescue save the most lives, and should thus be given to the most people. Globally instructors urge emergency agencies to provide at least awareness and operational level training as far out into the community as possible, while concentrating "technician" training in a core. Technician-level training, as promulgated by Special Rescue Services Group and its affiliated companies, is comprehensive, and requires pre-requisite skills, hard, third-party testing for validation, and then periodic re-testing. The time and expense involved puts such training beyond the reach of many organizations. Fortunately, as mentioned, operational level skills are the ones that make the majority of swiftwater and flood rescues anyway.

Students are trained in hazard assessment, "sizing up" the incident, the basics of incident command, risk versus benefit decision making, equipment, low to high risk rescue options, self-rescue skills, basic boat operations, orientation to helicopter rescue, and a variety of rescue skills, both shore-based and in-water.

While opinions vary, your author feels that the general low to high-risk alternatives for swiftwater and flood rescues would be as follows:

"Talk';
Reach;
Wade;
Throw
Helo
Row
Go
Tow"

This order is significantly different than that used at the outset in 1979, when helicopter rescue was truly conducted "by the seat of the pants," and incidents involving aircraft were substantial and deadly. Boat-based rescue has become the "darling" emergency services in the US, without the benefit of skills sets to accompany it; so boat related accidents are sharply on the rise. Further, boats are clearly less mechanically reliable than helicopters.

"Wade" has been added after it became evident that "health and safety" concerns were forcing some agencies to add an edict to their standard operating instructions dictating, that; "personnel at the operational level will not enter the water as policy." This led to a number of incidents where the victim was just out of reach of a thrown rope or ladder.

Wading rescues were thus added. Wading rescues are quick, simple, and straightforward, using techniques long ago developed for alpine and military stream crossings. "Technicians" are well versed in a variety of in-water, boat-based, and rope-based rescue skills. They operate in the "hot zone," and self-rescue is a primary requirement in their training. SRSG students are required to be able pass a swim test, and have technician level rope rescue skills BEFORE taking the course.

The largest number of "swiftwater rescues" involve vehicles and victims trapped in structures by rising water. The body of knowledge involving these situations is thus constantly being refined, and now includes rescuers actually training on cars immersed in current, in order to safely and quickly extricate trapped patients, and "USAR" type training to emphasize structural hazards in partially submerged and damaged buildings.

THE FOUR PHASES OF A FLOOD – THE THIRD PART OF THE SOLUTION

In the management level course, "Command and Control of Moving Water and Flood Rescue Operations" we identify the four distinct phases of a flood, and the events that occur within each phase, as a way for emergency manage to actually "manage," since they can predict with some accuracy exactly what will happen next, and pre-plan accordingly.

The first phase of the flood includes all of the concerns that public officials should deal with BEFORE THE FLOOD:

1 Regular flood drills should occur in emergency operations centers.
2 Recognition, registration and "typing" of flood rescue resources, regardless of

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Pic courtesy of Jim Segerstrom, Special Rescue Services Group

source, should be catalogued and updated by regional authorities.

3. Plans should be made about how to pre-position those resources ahead of potential flooding.
4. Training and equipping local rescue teams for immediate flood rescue is truly the most efficient use of available budgets, with less concentration on highly trained and equipped "national" rescue teams.
5. Evacuation "orders" should be made legally mandatory. In the US there is no such thing as a legally enforceable "evacuation order."
6. Government should consider creating "flood relief zones," geographic areas to which flood waters can be directed without significant damage to infrastructure.
7. Likewise, flood mitigation – condemnation and re-location of residents and businesses in the flood plains of rivers – and thus the creation of further flood relief zones – has been successful in many areas of North America.
8. And finally, authorities should devote significant efforts to public education. Experts estimate that the US government is currently spending only $1 on public education versus $300 on response capabilities. It should be evident that changing civilian behavior, and to emphasize personal responsibility will save more lives than the response. The success of public education reflects in the mindset of the populations of the eastern US, as they prepare and evacuate ahead of the growing storm menace.

The second phase of the flood is the "swiftwater rescue" phase, when all the rescues for which we have prepared so diligently actually occur. This phase, it should be noted, is the shortest of the four, occurring over a few hours or a few days at the most. However, the problems that occur are just as significant.

1. Rescue units are literally bombarded with calls for service, overtaxing even pre-deployed additional teams.
2. Additionally, public information is key in this phase, as emergency operations centers need to keep media outlets currently informed, feeding information to civilians.
3. Public information needs to be fed to dispatchers as well, since dispatch centers frequently do not receive current information on events.
4. Dispatchers are generally trained to dispatch units to calls as they are received, or prioritized. Experience has shown that initial calls may be more a matter of panic than a threat to life, while later calls may be true emergencies. So, "rescue priority dispatch" and pre-arrival instructions for civilians caught in water emergencies need to be added to the training for regional dispatch centers.

The third phase of the event is the "slow rise and water receding" phase. The water continues to spread creating large-scale problems for emergency units, but the life-threatening emergencies are generally at an end.

1. Search units will need to make sure that no more victims are trapped in place, in high-rise structures, bed-ridden patients, and the elderly, and evacuate them by boat. This means that boat searches play a large part in this phase.
2. Animal rescue becomes a major concern. Most flood emergency plans do not allow for household pets, and owners become frantic with worry. Animal rescue units are becoming a feature of US disaster response as the result.
3. This phase of the flood becomes a major hazardous materials incident, as waters inundate houses and industrial structures. Sewage and contaminated waters affect searchers capabilities and wellness. Emergency officials will need to consider gross decontamination facilities for searchers and victims as well.
4. The numbers of dead require field morgues to be operated; and dead animals become a disposal issue.
5. Looting is frequently an issue, and incident commanders will need to create a working "law branch" within the operations to deal with this growing threat.
6. Power and utilities must be appropriately dealt with. Indeed structure fires, as the result of loose propane tanks and power surges, are a major feature of large scale floods.

Finally, after days or weeks, the waters finally recede, in the forth phase, emergency services must direct the recovery operations.

1. Civilians want to return to check damage, so crowd control is an issue.
2. Structural and utility safety, are a significant responsibility.
3. Housing, food and emergency relief become the focus.
4. And finally, emergency agencies must recognize – NOW – that they are, once again, in the FIRST phase of the NEXT flood.

CONCLUSION

In the US, storms Camille, Floyd, Isabelle, Charley and Frances, spread out over nearly 40 years, have FINALLY affected the behavior of emergency managers. For Frances, emergency flood rescue teams were pre-positioned in the state ahead of the storm, bringing them from as far away as Kentucky. The National Guard was mobilized and set up in "task forces" with swiftwater and USAR teams. And, most importantly, mandatory evacuations worked, moving most of the population out of the way.

As a result, while the property damage in Florida was severe, the loss of life was small. That good news was quickly being overshadowed by the news that Ivan, an equally powerful storm was building in the South Atlantic.

Globally, it is due time for emergency services to gear up for the growing scale of flood events. Property losses will rise; lives lost does not need to.

Public education, preparedness, preplanning, and basic swiftwater rescue training, as far out into the community structure as possible are the keys, particularly in flood prone Asian countries.

Jim Segerstrom is the President of Special Rescue Services Group of California. He founded the international Swiftwater Rescue Technician program in 1979, which has been taught to tens of thousands of emergency responders around the world, and which he has been teaching in Japan for the past 8 years, now in conjunction with Special Rescue Services Japan.

Mr. Segerstrom is a published author and frequent speaker at international conferences. He is a regular contributor to both Technical Rescue Magazine in Britain and Advanced Rescue Technology Magazine in the US. A 30-year member of a SAR team in California, he is also a Technical Specialist for California Office of Emergency Services, and served as a flight paramedic for 18 years. He was an advisor to FEMA during the formation of the USAR Task Force system. He can be reached at jim@specialrescue.com.

Taiwan IFCAA 2004

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2004 International Fire and Safety Exhibition

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Disaster Response and Management Administration
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Disaster Prevention and Daily Life
Displays of emergency response measures、operational procedures and achievements of Government Agencies、Enterprises and Civic Organizations in the field disaster prevention and response.

Fire Prevention and Safety Equipment
Fire prevention and fire safety equipment
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23rd International Fire Chiefs' Association of Asia General Conference, 2004

November 17~19, 2004
Taipei International Convention Center

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Welcome to Taiwan IFCAA 2004

IFCAA 2004 Taiwan

The Global Vision on Disaster Preparedness and Response

IFCAA NFA

On behalf of the National Fire Agency of the Ministry of Interior, I am honored to invite you to attend the 23rd General Conference of the International Fire Chiefs' Association of Asia (IFCAA 2004) and the International Fire and Safety Exhibition 2004 to be held at Taipei, Taiwan from November 17 to 21. In addition to the routine Committee Meetings, Working Group Meetings, and the General Conference, various disaster-related keynote speeches, academic symposia and Fire Chiefs' presentations from different countries are also programmed with the contents covering hazard preparedness, fire rescue and systems, management and technical issues. The conference has, in addition to the academic programs, arranged in particular relevant technical visits, exhibition and social programs that would enable all delegates to exchange experiences and establish friendship through this bi-annual event.

With the recent global calamities stretching from the 921 earthquakes in Taiwan, the 911 terrorist attacks in America and SARS crisis in Asia, the importance of disaster management and emergency response is apparently identified and these great misfortunes had enabled us to learn many valuable lessons. In addition to elevate the disaster contingency ability in Taiwan, we also participate actively in the international disaster rescue operations to reciprocate the international community. Last year, the search and rescue team from Taiwan jointed the international humanitarian relief is in Bam, Iran is one of the practical activities. This would enable the Taiwan experience to be shared among our international organizations so that we could offer practical assistance to those countries and affected areas. We are indeed honored to have the opportunity to organize this conference. It is hoped that participants are able to understand in details the development of disaster preparedness and response among the Asia Pacific countries that could learn from each other. With the mutual exchange and practical sharing on relevant experiences, it is anticipated that all the strength of the Asia Pacific members could be associated so that the disaster preparedness and emergency operation works would satisfy better for the contemporary environment and people's demand when they are properly promoted.

Taiwan, a beautiful island called Formosa, is gifted with attractive and glamorous natural landscapes. Advanced economy, convenient transportation, hospitality and friendly people are worth for your personal venture. With the IFCAA 2004 held in Taiwan, we welcome you with our heartfelt enthusiasm for your visit and look forward to meeting you personally in this November.

Chi-Min Hwang
Director
National Fire Agency, Taiwan

IFCAA – The International Fire Chiefs' Association of Asia

The International Fire Chiefs' Association of Asia (IFCAA) traces its origins back the 10th General Conference of the Fire Chiefs' Association of Japan held in Tokyo in May 1958. It was agreed by the members of the Fire Chiefs' Association of Japan and by the representatives of fire prevention and emergency rescue organizations from other Asia Pacific nations attending the meeting that an international organization should be established with the aim of furthering the development of fire prevention work in Japan and in other Asia Pacific nations.

The objectives of the IFCAA were defined as follows:

- To maintain amicable relations between fire chiefs in the various nations that make up the Asia Pacific region.
- To promote the development of fire prevention technology and related research and training work so as to provide greater protection for life and property.
- To promote the exchange of knowledge in the areas of fire prevention and disaster prevention/response, thereby enhancing the level of fire prevention service in the nations of the Asia Pacific region.

The IFCAA currently has around 1,200 members in 23 Asia Pacific countries and regions. The member nations and regions represented on the Board of Directors include Australia, Bahrain, Bangladesh, Brunei, Hong Kong, India, Indonesia, Israel, Iran, South Korea, Kuwait, Malaysia, Mongolia, New Zealand, Pakistan, Papua New Guinea, the Philippines, Singapore, Syria, Sri Lanka, Thailand, Taiwan and Japan.

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IFCAA 2004 General Conference
November 17–19, 2004
Taipei International Convention Center, Taiwan

Theme & Topics

Main Theme

- The Global Vision on Disaster Preparedness and Response

Presentation Topics (partial)

Keynote Speeches

- Disaster Prevention System and Future Development of London
- Modernizing Fire and Emergency Services in Taiwan

Fire Chiefs' Presentation

- Crisis Management Framework and Extended Area Assistance System in Sendai City
- Earthquake Preparedness of the Tokyo Fire Department
- Emergency Response in Asia (Kuwait)
- Future Development on Emergency Response and Disaster Management in Australia
- Future Development on Emergency Response and Disaster Management in Korea
- Future Development on Emergency Response and Disaster Management in Malaysia
- Future Development on Emergency Response and Disaster Management in Iran
- Preparing Jakarta Metropolitan City in Response to Urban Disaster
- The Integrated Approach of Emergency Response in Singapore
- The Response to Acts of Terror – The Experience of Israel Fire and Rescue

Technical Seminars

- Developments in Building Design and Regulations
- Fire and Rescue Service
- Innovations in Community Safety Projects
- International Issues & Experiences
- Major Incident Planning
- Multi-agency Initiatives and Challenges
- Professional Training and Development
- Search and Rescue
- Terrorism Civil Protection & Disaster Management

Provisional Program

Wednesday, November 17, 2004

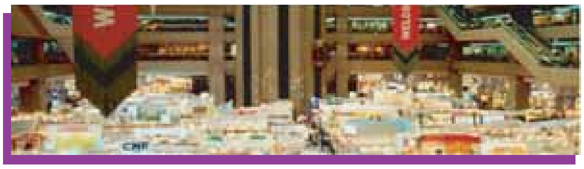
- The 3rd Asian Fire Service Standard Working Group Meeting
- IFCAA Board of Director Meeting & 2nd Committee Meeting for Asian Fire Service Standard
- Welcome Reception

Thursday, November 18, 2004

- Opening Ceremony
- Technical Seminars
- Technical Visit
- Conference Tour

Friday, November 19, 2004

- 23rd IFCAA Annual Report
- Keynote Speeches
- Fire Chiefs' Presentations
- Closing Ceremony
- Farewell Party
- Accompanying Persons' Tour



2004 International Fire and Safety Exhibition
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Exhibition Displays

Disaster Response and Management Administration

Exhibitors	Display Items
National Fire Agency, Ministry of the Interior	• The history of fire prevention work in Taiwan • Results achieved in the response to major disasters in the past • Disaster prevention/response experience zone • Multimedia zone

Disaster Prevention and Daily Life

Exhibitors	Display Items
Government Agencies	Emergency response measures, operational procedures and achievements of central government agencies and local government authorities
Enterprises	Disaster response measures, operational procedures and achievements of private enterprises
Civic Organizations	Achievements of relevant civic organizations

Fire Prevention and Safety Equipment Exhibition

Exhibitors	Display Items
Enterprises	• Fire prevention and fire safety equipment • Emergency rescue equipment • Electronic communications equipment • Fire prevention and emergency escue vehicles, aerospace equipment, etc.

Anticipation Benefits

- The 23rd International Fire Chiefs' Association of Asia General Conference and International Fire and Safety Exhibition 2004 are the most important fire prevention and disaster prevention/response conference and exhibition in Asia. More than 2,000 fire chiefs, senior managers and experts from every member nation/region are expected to attend. This is the ideal opportunity for enterprises to promote products in the Asia Pacific market.

- Besides the General Conference and Exhibition, the organizers have also planned some spectacular promotional activities that are expected to draw around 80,000 visitors. It is hoped that these activities will enhance the general public's awareness of disaster prevention issues and help them to appreciate the importance of disaster prevention and management. At the same time, these activities will also be a marvelous marketing opportunity for enterprises to promote in Taiwan.

- In addition to the specialist displays of disaster prevention equipment, we have also invited the IFCAA member nations and regions, various agencies of the Taiwan government and several large corporations to provide displays relating to their disaster prevention equipment, planning and achievements. These displays should provide a first-class forum for interaction and exchange between enterprises, agencies and companies concerned.

IFCAA 2004 Secretariat – NFA, Taiwan

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The Asia Manufacturing plant with the land build up area of 19,000 sq feet (1,900 sq meter) is the first rescue equipment manufacturing facility in Asia. With the strategically located high tech facility and a well trained and educated team, Zumro Asia will provide a competent technical support and immediate response to our Asian customers.

The establishment of a permanent center in Asia with two other facilities located in Europe and USA will provide a global coverage and round the clock dedication to all Rescue Organizations.

Contact Person: Mr Chua Guan Cheng
(General Manager)

COMBI-TOOL SHOWCASE

AMKUS RESCUE SYSTEMS

AMKUS Rescue Systems offers two Combination Tools that provide an ideal solution for “first response” applications. The models AMK-25C and AMK-C-15 Combination Tools allow the users to spread, cut and pull with the same tool.

AMKUS Rescue Systems operate at 10,500 psi. Both Combination Tool models are extremely lightweight and compact in size for easy storage. They offer a maximum cutting force of 57,000 lbs and a maximum cutting edge opening of 7.0 in. The AMK-C-15 is the more powerful of the two, with a maximum spreading force of 13,100 lbs.

Amkus AMK-25C

At AMKUS, “Quality” has been the foundation of our company for over 25 years. It is demonstrated in every tool and product, in every step of our process and in every one of our people. Firefighters and rescue workers know that teamwork can make the difference between success and failure. We are committed to being your teams trusted partner in providing rescue equipment you can depend on in every situation.

Amkus AMK-C-15

For further information, please contact:
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Downers Grove
IL 60515
USA
Tel: +1 630 515 1800
Fax: +1630 515 8866
E-mail: experts@amkus.com
Website: www.amkus.com

COMBI-TOOL RANGE FROM HOLMATRO RESCUE EQUIPMENT

As the world’s number one manufacturer of hydraulic rescue equipment **Holmatro** offers various Combi-tool models for a wide variety of cutting, spreading, squeezing and pulling applications, e.g. in Road Traffic Accidents (RTA) and during Urban Search And Rescue (USAR) operations. The versatility of these tools makes them highly suitable for rapid intervention purposes or use in confined spaces where there is no room for a separate cutter and spreader. Holmatro® Combi-tools can be divided into 2 main categories: models driven by an external pump and self-contained Combi-tools (which operate without a separate pump).

Pump-Driven Combi-tools

Holmatro CT 3120+

Holmatro’s CT 3120+ Combi-tool can be used in combination with a petrol, diesel, electric, air, hand or foot pump. Other important features of this model include:

- cutting, spreading, squeezing and pulling with one tool
- low ready-for-use weight of only 9.3 kg
- large blade opening
- specially designed inner serration of blades and tips for optimal cutting and squeezing performances
- unique outer serration of tips for maximal grip during spreading
- ergonomic design: non-slip carrying handle with perfect grip, well-balanced tool, safe and user-friendly proportional deadman’s handle

Apart from higher forces and performances and a ready-for-use weight of 14.8 kg the features of the Holmatro® CT 3150+ combi-tool are similar to those of model CT 3120+.

Self-contained Combi-tools

The product range of Holmatro includes 2 types of self-contained Combi-tools: a battery- operated and a hand-operated Combi-tool. The biggest advantage of these tools is that they function independently from pumps and hoses without any compromise to force and performance. Being compact, lightweight and easy to carry and operate by one person in addition, they are highly suitable for applications in difficult to reach areas or confined spaces, such as collapsed buildings and trenches or on top of a ladder. Delivering the same performance as their pump-driven equivalents Holmatro’s self-contained Combi-tools are also suitable for any ‘regular’ RTA or USAR application.

Holmatro BCT 3120+

Features Holmatro® battery-operated Combi-tool BCT 3120+:

- tool and power source in one: truly cordless!
- powered by integrated advanced battery technology from DEWALT®
- battery can be changed in 2 seconds thanks to click-on/click-off system (no interruption of rescue operation)
- battery rechargeable up to 60% in 30 minutes and up to 100% within the hour
- weight below 15 kg including battery
- well-balanced ergonomic design
- very compact design allows for use in confined spaces like e.g. manholes; in addition the tool takes little space when transported or stored in the rescue vehicle

Holmatro HCT 3120+

Features Holmatro® hand-operated Combi-tool HCT 3120+:

- tool and power source in one
- powered by integrated, manually-operated 2-stage pump
- operation handle can be rotated 180° (less repositioning of tool required)
- operation handle can be folded up for easy transport and storage
- weight only 10.5 kg (ready for use)
- ergonomic design: non-slip carrying handle and operation handle with unique rotation system
- easy to use by 1 person, without additional help: you only need one hand to hold the (lightweight!) tool while operating it with the other

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Fax. +31 162 52 24 82
E-mail: info@holmatro.com
Website : www.holmatro.com

HURST COMBINATION TOOLS

Cut and spread with maximum efficiency. Hurst combination tools provide the cutting power you demand for quick response as well as the spreading power you need to reach injured persons quickly.

Features:

— Lightweight and effective
— Can be used for spreading, cutting and pulling
— "Deadman" control valve enhances safety
— Spring guarded pigtail hoses
— Operates from all Hurst power units

Hurst ML-16S Maverick

ML-16S Maverick

Compact and lightweight, the ML-16S Maverick offers outstanding performance. Ideal for general automotive extrication, it is especially designed for the first measures to be taken at the scene of an accident and for ensuring quick access to injured persons. It is also an excellent tool to build a system around and can be used as a supplement to an existing system in situations when quick response is vital.

For further information, please contact:
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Fax: +1 704 487 7271
Email: rleonard@haleproducts.com
Website: www.jawsoflife.com

LUKAS HYDRAULIK GMBH COMBI-TOOLS

Insulated LUKAS Combi Tool for hybrid vehicles LKS 35 Fi

High-performance combi tool with unique current insulation for rescue work after road traffic accidents. Especially developed for working on hybrid cars with additional high-voltage electric motor. It provids extra safety when cutting or spreading charged parts of all kind – of course only within the permissible limits.

Recommended applications:

- road traffic accidents, even accidents where
- hybrid cars are involved
- cutting of charged parts e.g. in buildings or on
- sea vessels
- rescue work after natural catastrophies
- cutting of metal constructions, vehicle parts,
- tubes, profiles etc.
- cutting work in power plants

LUKAS LKS 35 Fi

Highlights:

- the tools are safe for a object voltage of 1500 V
- DC or 1000 V AC (safety factor 1:10 is certified by LGA, the most prominent German safety institute)
- eventually dangerous damage of the insulation boot can easily be checked visually: a yellow layer becomes visible
- tools equipped with non-conductive hydraulic hoses (3 m long)
- plastic capsules for protection of the couplings
- operator's safety features – all moving mechanical
- parts are covered and insulated
- regrindable blades
- easy operation through minimum weight and compact design
- precise operation with your finger tips in any position

LUKAS Unitool LKS 31

Combination tool with integrated hand pump cuts and spreads

Highly portable for rescue operations in areas difficult to access. Rotating tool head can be adjusted in any desired angle for 360 degrees.

LUKAS Unitool LKS 31

Recommended applications:

- Rescue operations in traffic accidents
- Urban rescue operations
- Disaster management
- Rescue operations on top of ladders or in wilderness areas
- Moving and lifting of obstacles
- Opening doors and deforming of metal structures
- Cutting of metal constructions, vehicle parts, pipes, sheet metal etc.

Highlights:

- No external power source is required
- Lightweight and highly portable – can be taken even on a motorcycle
- Cutting and spreading with one tool
- Easy to operate – automatic change over from low pressure to high pressure
- For use in areas with explosive risks.
- Intrinsically safe

LUKAS Battery Powered Combi-Tool LKE 51

LUKAS Accu-tool for rescue operations – the powerful tool combined with innovative technique

Battery powered, self-contained, combination tool for cutting and spreading. The source of energy is a built-in 24 V NC battery pack. The ideal tool for rescue operations in areas difficult to access.

LUKAS Battery Powered Combi-Tool LKE 51

Recommended applications:

- Rescue operations in traffic accidents
- Urban rescue operations
- Disaster management
- Rescue operations on top of ladders or
- in wilderness areas

Highlights:

- Independent from external power unit – no hoses
- no cables – ready anytime
- Compact and lightweight – can be stored in a passenger car
- Cutting and spreading without any changes of the tool
- Fast opening and closing speeds up the rescue
- The charge of the built-in battery pack allows for rescue operations involving one vehicle. A back-up battery pack allows you to go on, if needed.
- Ready for action again after only 1 hour of charging the battery pack

Double Power and Double Spreading – LUKAS Telescopic Ram LTR 12

The sum of all advantages: Unsurpassed performance

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✓ *Double spreading – two pistons at a time (1505 mm total lenght)*
✓ *Only one ram can do the job of two standard rams*
✓ *Compact lightmetal design saves weight and storage space*

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JAWS OF LIFE

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LUKAS

LUKAS Mobile Combi Tool LKS 21EN

The sensational light LUKAS Combitool LKS 21 EN for fast and powerful rescue operations. It includes technical and safety features in accordance with the high standard of the whole LUKAS rescue program.

LUKAS Mobile Combi Tool LKS 21EN

Recommended applications:

- Rescue jobs in traffic accidents
- urban rescue
- disaster management
- mobile rescue operations

Highlights:

- Cutting and spreading without any changes of the tool
- low oil consumption – ideal for the combination with a mobile hydraulic pump (e.g. LUKAS CP 100)
- Precise tool operation with your fingertips in any position
- Fast opening and closing action speeds up the rescue
- Operator safety design – all moving mechanical parts are covered
- Regrindable blades
- Tool fully balanced

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NIKE HYDRAULICS AB

Double-Acting Hydraulic Combi-Tool DHK45/370

The DHK45/370 is a powerful combination tool for cutting, spreading and pulling tasks. It is controlled by the same practical twist-grip with dead man's handle as the other tools.

The spreader tips with the quick-lock system can easily be removed e.g. for cutting from one side and supporting from the other side (for example car roofs, steel panels, etc.). When both tips are removed, the DHK45/370 can be used as an ordinary hydraulic cutter. The serrated blades made of hardened steel guarantees good grip and cutting performance.

Nike Double-Acting Hydraulic Combi-Tool DHK45/370

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OGURA & CO. LTD.

BC-250 Combination Tool

The BC-250 battery-powered Combi-Tool has become the flagship product in Ogura's range of advanced electro-hydraulic rescue tools. Manufactured from a special aluminium alloy and weighing only 13.5 kg, the BC-250 is the lightest tool in its class but delivers a truly heavy-weight performance. Designed to fill the portability gap left by the more traditional heavy tools, the BC-250 provides the Emergency Services with an extremely light and versatile tool for a variety of rescue situations.

The excellent handling ability of the BC-250 is enhanced by it narrow profile and rotating pistol grip style handle that allows the tool to be properly positioned to the target while at the same time reducing any trapping hazard. The commercially available 18 V battery that powers the system slots into the base of the pistol grip style handle where it is easily removed for charging or changing. Battery maintenance is improved with the Ni-MH battery that can be charged at any state of discharge, while the "intelligent battery charger" makes sure that the battery is never over charged.

Ogura BC-250 Combination Tool

Once on site there is no set-up time and the BC-250 is ready for immediate deployment. In operation there are no trailing hoses or cables to create a tripping hazard and movement is unlimited.

The BC-250 comes in a carrying cases complete with Battery, Battery Cover, Battery Charger, Spanners, Oil Container and Manuals. The dimension of the case is 790 x 590 x 240 mm and the packing weight is 22 kg.

Options available include: Carrying Frame, Pulling Attachments, and RoboPak for extended battery life.

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TNT'S COMBI TOOLS HAVE THE ADVANTAGE

At TNT, customer service is more than a phrase, it's a way of life. That way of life translates into every tool we put into the hands of our customers. By offering a full range of extrication equipment, TNT can create the most effective grouping of tools for your department. From Spreaders to Rams, Cutters to Combi Tools and Pumps to Lifting Bags, TNT has got you covered.

There are two models in our line of Combination Tools – the CC-20 and the CC-30, both of which are loaded with important user-friendly features. The CC-20 is designed to function primarily as a Cutter and secondarily as a Spreader. The CC-30 is the opposite, as a primary Spreader and a secondary Cutter. Our Combi Tools were developed with the user in mind, in an attempt to make

TNT CC-20 and CC-30 Combi Tools

them the most functional tools available in critical situations. On the CC-20 there is a cutting edge along the full length of the blade, thereby allowing for a longer cut. The spreader arm/cutter blades on TNT Combi Tools are made from high quality, heat-treated tool steel. Another important feature of the Combi Tools is the variable speed, deadman control, which increases manageability in critical situations. Plus, the Combi Tools are finished with a wear resistant, anodized surface.

The durability of TNT tools is a top priority. We understand that purchasing tools is a significant investment for a department of any size and want to ensure that our tools are made to last. We are dedicated to our distributors, end users and in turn the victims, in a way that is second to none. This dedication begins with our comprehensive lifetime warranty and is executed in our 24-hour service guarantee.

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ZUMRO RESQ 190 FRONTLINER

The ResQ 190 Frontliner, one of the best impact free cutting-tool in the Zumro ResQ line of hydraulic rescue equipment, has an excellent balance. Zumro always works with the safe working pressure of 350 bar and therefore the complete range of cutters and combi tools cut impact free, even if the latest designs of car constructions.

The unique feature of this ResQ 190 Frontliner are the detachable tips that makes this combi tool both a dedicated cutter and a dedicated spreader.

The ResQ 190 Frontliner has a spreading capacity up to 99.5 kN at the base and even a 3.8 ton spreading force at the tips.

The cutting force of this dedicated spreader/cutter is 326 kN and it weighs only 14.4 kg. Therefore we can say this ResQ 190 Frontliner has an excellent power to weight ratio.

Zumro ResQ 190 Frontliner

The pulling force is 37 kN and this all makes this Combi Tool a perfect tool to use.

Of course, this ResQ 190 Frontliner is also equipped with Zumro's unique *' truly flat face connectors'.* These flat face connectors allow you to blindly connect the couplings without any hazard of getting sand or dirt into the connectors while connecting them to the rescue tools. Any possible sand or dirt can simply be removed by wiping it away by the hand.

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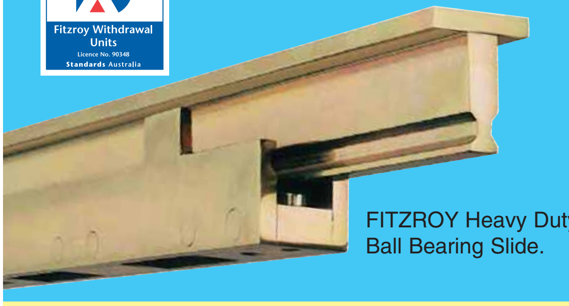

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MHL9547

The Apparatus Decision

Pic courtesy of KME Fire Apparatus

By Phil Gerace, Director of Sales and Marketing, KME Fire Apparatus

THE PURCHASE OF NEW fire apparatus is not only one of the largest financial decisions made by a fire department; it is also a decision that will affect the department's operational capability for decades. That is why it is critical that such a decision be made by using a process based upon current information rather than upon emotion or past practice. A small investment in apparatus research can pay off huge dividends for those organizations that make the effort.

The first task is to decide the general capabilities required of the apparatus. This is not a decision about how much horsepower is needed or how high the crew roof should be. Instead it's an honest accounting of what will be the mission of the apparatus. Will it need to carry rescue tools? Is foam capability required? In the case of an aerial, what kind of access restrictions will be encountered within the Department's protection district? What challenges do local streets and inclines present? In short, what will be demanded of the truck both today and in the future?

Once a basic agreement has been made as to the general capabilities, an apparatus committee is often formed. It's a great system that should consist of a variety of personnel with different operational backgrounds that include individuals with procurement, mechanical/service, and fire ground experience. The challenge is finding sufficient diversity without making the group larger than about five people. Larger groups are often burdened by spending more time on the dynamics of working on committees than on the task itself.

If new apparatus hasn't been purchased within the last five to seven years, when a Committee is assembled, it is important that some or all of them schedule visits with several fire apparatus manufacturers. This will allow them to make fair and accurate comparisons between industry suppliers, but more importantly will provide the decision makers with important information about new technologies and popular options that can be included in the specification that will be released by the fire department. Another alternative to the plant visit is a national tradeshow. Here you can speak with both apparatus manufacturers and component suppliers for the most up to date information. A current list of major fire service tradeshows can be found on the Fire Apparatus Manufacturer's Association's website at http://www.fama.org/Site/Calendar/.

When the Committee has been formed and they've made their visits, the next step is to begin writing a specification. NFPA 1901, 2003 Edition includes an Annex B entitled "Specifying and Procuring Fire Apparatus". The forms within this annex can be useful tools to make sure that all relevant areas of the apparatus are considered when writing the specification, as well as insuring that the spec will result in a truck that meets the NFPA minimum standards. The forms include procurement issues,

Pic courtesy of KME Fire Apparatus

Pic courtesy of KME Fire Apparatus

apparatus dimensions, operational conditions, equipment, chassis components, electrical systems, crew areas, body compartments, fire pump, water tank, aerial devices, foam systems, command and communications, air systems, and winches. All major areas are covered, but the Apparatus Committee must still decide the configuration to bid, the manufacturers' warranties being requested, special support requirements, inspection trips, and the specifics of the bidding process. It is important to note that the decisions made at this point have a significant affect on the final price of the vehicle and the number of bidders.

As the Department configures the apparatus specification to meet their needs, how far they stray from the industry "norm" and from the "standards" of each manufacturer will affect the overall bid price. For example, it's fine to specify overall dimensions and placement of components, but trying to micromanage compartment dimensions or trying to pre-plumb the pump by noting overly specific plumbing restrictions either increases the cost of the truck or decreases the number of bidders. However, at the other end of the spectrum, following any one manufacturer's norms or suggested specifications too closely can often also lead to increased prices and decreased bidders. When a department writes a specification that includes items like the number of fins in a radiator, the exact alloy or dimensions of an extruded support member, or any other proprietary verbiage from a specific manufacturer, it is telling all potential bidders that the bid will somehow favor a particular bidder. This not only decreases the number of potential bidders, but of those suppliers that do bid, they must increase their price to meet that particular spec item.

Areas like extended warranties or special service requirements should also be considered. While these requirements can add significantly to the overall price of the vehicles when the department is bidding only one or two trucks, on multiple unit bids, the overall cost is usually heavily discounted. If you want a five year bumper to bumper warranty or the truck representative to transport the vehicle at no charge to his service center under warranty, now is the time to write that into the spec. Remember, the Fire Department has to live with these decisions for a decade or more, so they must think carefully about what's best for the long term.

Inspection trips are another factor that contributes greatly to the overall acquisition cost. The Apparatus Committee can choose to bid them as part of the overall price, bid them as options, or pay for them out of the Department budget. If they're included in the bid, make no mistake the Fire Department pays for these trips. The frequency and group size of these trips varies from department to department so there is no industry standard. It is recommended that at least two (and usually three) trips take place. The first trip should be the Pre-Engineering or Pre-Construction Conference. This is a meeting in which the manufacturer discusses exactly how they plan to implement the solutions to each of the requirements in the bid. There are opportunities to get suggestions from the manufacturer about changes that might better satisfy the Department's needs. There are also usually questions asked that the department might not have considered, so every decision may not always be made

Pic courtesy of KME Fire Apparatus

during the meeting. The apparatus committee should also be aware that this is a meeting in which it's important to make any remaining changes to the spec. Cost changes at this point are minimal, however at future points during construction, changes may either be very expensive or not even possible. The second trip is usually a trip just before the unit goes into paint. This allows the Committee to see a finished body, but still allows for a moderate amount of changes. The last trip is usually either a 90% or 100% final inspection. At this point the apparatus is painted, assembled, and all major components are installed. The unit is either done or having the last few trim items completed. Bring as many Committee members as possible on this trip. Have everyone either agree that the truck meets spec and will fill the needs of the department, or make whatever changes are necessary (i.e. additional steps, lights, or switches) so that when the apparatus arrives at the station, it receives the full support of the committee. One of the biggest mistakes made at this final inspection trip is not allowing sufficient time to review the apparatus. It is recommended that committee members go line by line through the specification, making sure that all items and changes are covered. Once the truck is in the station is not the time to mention that the Fire Department thought there would be an extra light in one of the compartments. Once again, attention to detail is important since what the committee accepts at delivery will be part of the department for years to come.

Pic courtesy of KME Fire Apparatus

The specifics of the bid process should be carefully considered. At a minimum, a 100% performance bond should be required to make sure that manufacturers without the financial stability to stand behind their products and warranties will not be considered. Bidders should be given at least four weeks to prepare a bid. If the Department is bidding multiple units, it might also pay to have a mandatory Pre-Bid Meeting. This allows potential bidders to view the specification ahead of time and air specific questions or complaints about items that in their view lack clarity, conflict, or greatly favor another manufacturer. This meeting will really help the bidding Department hone their specs and at the very least, helps to minimize protests at the time of award. It is also critical to make sure that all bidders clearly and explicitly state any and all exceptions to the specification at the very beginning of their bid.

A specific date and time should be announced for the receipt of bids. How such receipts are handled should be up to the Department's legal counsel, but to have a meeting to announce the results of these bids is often a waste of time. One should expect that bid numbers will vary greatly and often because of the number of exceptions taken. If a particular manufacturer has partially or completely ignored the department's specification, the department may not want to give a "false impression" of that manufacturer being "low bid" to the department, other bidders, or other interested parties. Unusually low bid numbers may at times seem attractive in certain political agendas, thereby causing pressure to purchase apparatus that does not meet the needs of the Fire Department. However, if the Apparatus Committee has done its job, the spec and compliant bids should be the only considerations and can be defended to those with a financial concern as their primary interest. If this is a major concern however, the Fire Department may choose to do a Request for Proposal (RFP) instead of a bid. Above is a comparison chart of the major features of each.

BIDS	RFPs
Open at specified time and date, publicly read bidder's name, price, items offered, F.O.B points, delivery, etc.	Close at specified time and date; read only the names of suppliers submitting proposals.
No discussion with bidders allowed.	Discussion with suppliers permitted with restrictions specified prior to the submittals.
Evaluate against specifications.	Evaluate against evaluation criteria and against competing proposals.
Entire procurement public record.	Awarded contract public record.

Evaluation of the final bids or RFP's can often be confusing because typically, even when the Fire Department requests it, bids are generally not in similar order. One method to evaluate bids is a points system. Points are either awarded or deducted for spec compliance or lack thereof. Extra points may be awarded for exceeding specifications. This point system is often weighted and can be somewhat complicated. An easier method is to simply first, evaluate all bids for compliance. Remove any bid that does not comply on a specification that is substantive. Then have everyone on the Apparatus Committee review all remaining bids. Obviously the lowest bid will receive the greatest attention, but remember low bid isn't always the most responsible bid. Carefully consider the past experiences or reputations of vendors in terms of quality, service, and delivery. Look for a well prepared, logical, and professional bid. If the vendor isn't able to organize the bid properly, can they really build the truck properly. In short, find the bid that best meets the needs of the Department both financially and operationally.

Once the final award decision is made a new process begins with both opportunities and pitfalls in the manufacture of the new apparatus. This process too should be done with thoughtful research and the ability to stay true to the stated needs of the Fire Department. If the Department has done its homework up front though, they will be adequately prepared to face all remaining challenges.

Hoping for the best

Prepared for the worst

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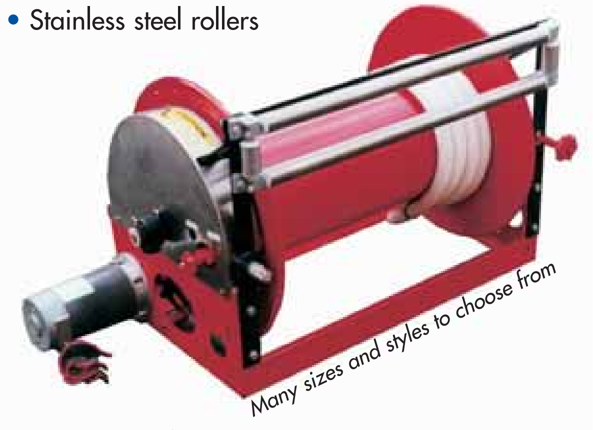

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Latest Techniques and Innovations in Hazmat and Decontamination Training

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By Gary West, CertEd, Course Director at Washington Hall International Training and Development Centre

Lancashire Fire and Rescue Service's Head of Training, Dave Paton stated that:

"The emergency services must make strenuous efforts through multi-agency training to prepare for any large scale incident involving hazardous materials, whether accidental or deliberate. Many people believe it is not 'if' this country will be subjected to a terrorist attack involving chemical, biological, radioactive or nuclear (CBRN) materials, it is 'when'."

Incidents involving hazardous materials (Hazmats) have changed dramatically over the past few years for many reasons, not least the increased threat from terrorist organisations utilising Chemical, Biological, Radiological and Nuclear weapons.

The Fire Service have long been involved in the containment and management of incidents involving the accidental release of hazardous materials.

The training applied in dealing with Hazmat incidents, safe systems of work, risk assessments, decontamination of Fire Service personnel, decontamination of the general public, and the issues affecting the environment, is extremely intense and extensive.

HAZMATS

Throughout the United Kingdom, pre-planning is an essential element of responding to an incident involving Hazmats. In most cases, type, location and quantity of Hazmats is known, due to the requirements imposed on a fire authority under current legislation. Based upon this knowledge (which is usually obtained by inspection) methods of dealing with such incidents and the personal protective equipment required is known by potential responders. However, transportation of chemicals and Hazmats is obviously a little more difficult to predict.

Disposal of chemicals is an ongoing problem internationally. This results in reclamation companies running a business to dispose of chemicals. Difficulties resulting from this, which **firefighters quite often have to deal with, are mixtures of unknown and unlabelled chemicals gassing off uncontrollably.** Consequently having the correct methods to deal with the incident and Personal Protective Equipment become critically important.

Following mobilisation to a Hazmat incident, exact information on the route to an incident regarding the slope of the ground, wind direction and other meteorological issues is vital. In the UK, a scheme referred to as 'CHEMET' is provided. This is a nation-wide service available on a specially selected network of meteorological offices. The offices are open permanently, and are staffed by experienced forecasters.

Also available nationally is a scheme referred to as 'CHEMSAFE'. This is the United Kingdom Chemical Industry response scheme for providing rapid, expert advice and support in the event of an emergency during the distribution of chemical products. It applies to all chemicals, not just those which are classified as hazardous. CHEMSAFE is primarily intended for land based incidents including those at docks, harbours and airports. The scheme basically ensures that an appropriate and co-ordinated response is made to minimise any potential adverse effects of an incident to both the public and the environment.

During the emergency phase of an incident, supervisory officers (with an enhanced knowledge of Hazmats) are mobilised. Their role is to provide valuable support to the incident

Pic courtesy of Washington Hall International Training and Development Centre

commander at known chemical incidents, and they should remain dedicated to this task throughout. This officer should provide the technical advice, procedural guidance and logistical support for the incident commander.

On arrival at an incident (and once the Hazmat has been identified) more in depth information on the substance involved, level of protection required, and methods of dealing with the incident can be obtained via a centralised Control Centre. The information that they are able to provide to officers at the scene is via a computer programme referred to as 'Harwell Chemdata'. This programme is designed to run on a micro processor enabling Control to rapidly identify those properties of chemicals which will be of value to the Incident Commander. The data bank provided with the programme contains many thousands of entries and is available to the National Chemical Emergencies Centre at the Harwell Laboratory of the United Kingdom Atomic Energy Authority. The programme is provided to the Fire Service under a licensing agreement which ensures regular information updates in order that the incident can be tackled using the most effective methods.

The information available from this scheme includes the product name, the emergency action code, the hazards to personnel and the environment, the physical form, precautions to be taken, what to do in case of fire, the substance identification number, the UN hazard class, the ADR/RID code, the CEFIC TREMCARD, specialist advice available, preferred decontamination method (wet/dry), IMDG CODE (International Maritime Dangerous Goods), the NFPA Code (National Fire Protection Association), and the type of First Aid that can be administered.

Transportation of Hazmats presents a different problem. In the UK, The Carriage of Dangerous Goods by Road Regulations 1996 determines the criteria necessary to undertake such transportation. There are two forms of hazard identification permitted under the above regulations, the HAZCHEM Code and the ADR number. Vehicles carrying such a substance must display three Hazard Warning Panels known as UKTHIS labels (United Kingdom Transport Hazard Identification Scheme).

Information provided on this label consists of The Emergency Action Code, The United Nations number, a Hazard warning sign, a number offering Specialist advice, and the manufacturer's name or house symbol.

DECONTAMINATION

A National Memorandum of Understanding has been agreed in the UK between the Office of the Deputy Prime Minister and the Department of Health which gives the function for Mass Emergency Decontamination to the Fire Service.

Prior to addressing the structure of how these procedures have been implemented ***to*** within the Fire Service, it is important to ascertain the procedures currently in situ, and how resources manage Hazmat incidents prior to mass decontamination procedures being applied.

There are four levels of response to a Hazmat incident:

- Level One – First Attendance Response
- Level Two – Brigade IRU (Incident Response Unit)
- Level Three – Regional IRU
- Level Four – National Response

During a level one response, normal brigade decontamination procedures will apply for both the general public and for the firefighters themselves. This normally takes the form of setting fire appliances in a position where the public are able to walk between them and be showered from above, although it is widely believed that 80% of the contaminant on a person can be removed simply by undressing. The level one response may also involve the use of the CIU (Chemical Incident Unit) and the ISU (Incident Support Unit) in order to facilitate decontamination generally.

As with every Hazmat incident scene, clean and dirty areas must be distinguished, with a clearly defined inner and outer cordon.

Early decisions must be made by the officer in charge bearing in mind issues

> *There are two forms of hazard identification permitted under the above regulations, the HAZCHEM Code and the ADR number. Vehicles carrying such a substance must display three Hazard Warning Panels known as UKTHIS labels (United Kingdom Transport Hazard Identification Scheme).*

Pic courtesy of Washington Hall International Training and Development Centre

such as gradient of the land, wind direction, the nature of the chemical, the degree of decontamination required, the type of personal protective equipment necessary, the risk to the environment, water supplies and drainage facilities, as well as all other necessary agencies and resources which may need to be contacted.

Currently, it is the Ambulance Service who are responsible for the decontamination of the general public, but on occasions in the past, it has been necessary to work alongside the Fire Service due to a variety of issues, not least numbers of victims requiring decontamination.

Following extensive trials by the Home Office Fire Experimental Unit (1995), it was concluded that the most effective method of decontamination was achieved by using a suitable detergent, water and scrubbing brush, followed by a full rinse.

Despite Accident and Emergency Departments and the Ambulance Service being more than capable of implementing this, since ‘9/11’ it has become necessary to impose contingency plans and responsibilities for decontamination of many people at any one time. **In a situation where mass public decontamination is required, theoretically all authorities involved would be attempting to achieve decontamination of 20,000 people in around 8 hours.**

In order to achieve these targets and to be capable of responding and reacting to a potential chemical, biological, radiological or nuclear related incident, the Government has supplied equipment and appliances in vast numbers.

As a result of this and following the interim measures imposed by a Fire Service at this type of incident, the levels of response for the ‘Incident Response Units’ were determined.

These are:

- Level One – Brigade Response
- Level Two – Brigade IRU
- Level Three – Regional Response
- Level Four – National Response

For a Level Four incident, the potential of 300 appliances attending is a fairly realistic estimation. This apart,

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the numbers of other vehicles, personnel, and resources necessary, combine to determine the extreme levels of control necessary to successfully ***conclude*** such a scenario.

As with any type of incident where decontamination is required, the area is usually split into three; the 'hot zone,' 'warm zone', and 'cold zone'.

The Fire Service is responsible for all personnel within both the hot and warm zones. Once successfully decontaminated, within the cold zone, the Ambulance Service will triage the victims again, and decide whether or not they must attend at hospital, or be taken to an appropriate rest centre.

It is widely believed that for one incident response unit, 400 persons could successfully be decontaminated per hour. This of course is not always going to be achievable. For example, should some of the victims also be casualties, and require a further level of assistance in decontaminating themselves, the process is naturally going to be a lot slower.

For this potential problem, the vehicles have been stowed with decontamination equipment adaptable for victims who are either ambulant or non-ambulant, and are still subject to the dis-robe, three-minute wash/rinse cycle, and re-robe procedures in situ.

Although Hazmats and Decontamination are extremely intense subjects, the basic principles applied within the Fire Service have been covered above. It is important to understand however, that no two incidents are the same. For example, the type of hazard, location of hazard, nature of hazard, what form the hazard is in (liquid/gas etc), quantities of the hazard, and numbers of victims and casualties who need decontaminating can vary enormously. It is also very important to impose some form of containment, not only of the Hazmat, but also of the persons contaminated. Should the second point not be administered, the potential of the 'hot zone' then becomes almost uncontrollable. If victims are wandering all over the place, possibly even attempting to self facilitate their own decontamination at the local hospital, consequently this also becomes contaminated.

To conclude briefly, in support of the previous statement, the quality and level of control at an incident involving Hazmats has to be maintained at the highest possible standard, from development of the incident, right through to the conclusion of the decontamination process.

Gary West, CertEd is a Course Director at Washington Hall International Training and Development Centre.

Gary sits on a national body for the New Dimensions Project. This project is driven by the Government's responsibility to meet the threat of modern day terrorism in terms of resources, specialist equipment and expertise. His work involves designing and developing standards to be adopted nationally to meet this threat.

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Fike Corporation, a worldwide innovator in fire suppression equipment, and DuPont™, the global industry leader in fire-extinguishing agents have teamed up to develop a superior cost-effective Clean Agent Fire Suppression System. This new system, ECARO-25™, utilizes DuPont™ FE-25™ fire extinguishing agent. Its features and benefits make it the most cost-effective fire protection solution available to the market.

ECARO-25 vs. HFC-227ea

The Fire Protection industry's most widely accepted alternative to Halon 1301 systems has been HFC-227ea (FE-227™ or FM-200®). Unfortunately, with HFC-227ea systems, many of the benefits the industry had with Halon 1301 were lost. The larger negative factors of HFC-227ea are its slower, heavier flow characteristics, greater agent quantity in volume and most importantly the overall cost of the system. Looking back, if we would have known then what we know now with respect to realistic Class-A fire testing and the use of PBPK modeling, HFC-227ea might not have never become as commercially successful clean agent product, and HFC-125 would had been the leading Halon alternative. This is primarily due to the many advantages ECARO-25 (HFC-125) have over HFC-227ea systems in regards to superior flow characteristics, agent quantity, environmental impact and other design aspects that make it a more superior clean agent fire extinguishant and system.

Agent Quantity

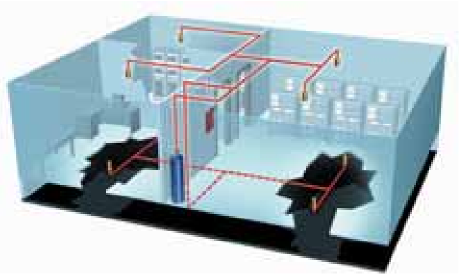
Per cubic foot, ECARO-25 requires 20% less agent than HFC-227ea. The minimum design concentration for ECARO-25 is 8.0% v/v and for HFC-227ea it is 7.0%, which would appear to the untrained that more agent would be required when utilizing ECARO-25. This isn't so! Due to the reduced vapor density of HFC-125, you need 20% less agent, per cubic foot, as compared to HFC-227ea. Additionally, because of its reduced vapor pressure it flows quicker and easier than HFC-227ea.

Agent Flow

ECARO-25 demonstrates the closest physical property match to Halon 1301 in terms of flow characteristics and vapor pressure. ECARO-25 has a vapor pressure of 195 psi @ 70°F, which is very close to Halon 1301's natural vapor pressure of 199 psi @ 70°F. By comparison, the natural vapour pressure of HFC-227ea (FE-227™ or FM-200®) is 66 psi @ 70°F. Because ECARO-25 has the same superior flow characteristics that Halon does, it can easily flow in the same pipe network without major changes and still comply with all NFPA design and delivery criteria.

Agent Hold Time

The design concentration, or minimum calculated quantity of clean agent, must remain in the protected space for a specified period of time to extinguish a fire, and guidelines on this practice can be referred to in Appendix C of the National Fire Protection Association 2001 Standard. The industry norm is to hold the agent concentration within the protected space for a minimum of 10 minutes, which can be a challenging accomplishment, especially for smaller volumes. ECARO-25 presents a ~19% agent retention/hold-time advantage over HFC-227ea.



Environmental Impact

HFC-125 is an environmentally preferred alternative to Halon 1301. Unlike Halon, HFC-125 does not contain chlorine or bromine and therefore has a zero ozone-depletion potential (ODP). Like many fluorine-based gases, HFC-125 has minor global warming potential (GWP). The global warming potential for HFC-125 is 2,800, based on a 100-year time horizon relative to CO_2. This is one of the lowest for the chemical agents commercially available, and slightly below HFC-227ea. The overall environmental impact is minimized by improved detection technology that reduces unwanted emissions into the environment. Factoring the agents minimum design concentrations and the GWP values together, the overall environmental impact of HFC-125 is 23% less than HFC-227ea and 46% less than Halon 1301.

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ECARO-25, together with Fike's rapid detection and control equipment, provides the superior level of protection necessary for high-value assets and businesses that can't afford business interruption, downtime or loss in revenue as a result of a fire. HFC-125 extinguishes fires at the molecular level, without reducing the oxygen supply of the protected space. It extinguishes fires by absorbing heat and interrupting the combustion reaction so a fire cannot sustain itself. Fires are quickly detected and extinguished before damage from smoke or flames can occur. Because oxygen levels are not affected by ECARO-25 (HFC-125), it poses no threat to people, even those present at the time of discharge.

Unlike traditional water-based sprinkler systems, the clean agent used in an ECARO-25 system is non-conductive, non-corrosive, and leaves no residue, so it will not damage high-value assets or electrical components or pose a clean up problem.

Summary

In 2001, Fike and DuPont™ formed a strategic alliance to better serve the fire protection industry and set out to develop a superior clean agent fire suppression system that is both more cost-effective and, asset & people safe. ECARO-25 is the culmination of this effort and it is evident from the features and benefits presented here that ECARO-25 is the **Future of Clean Agent Fire Protection.** Fike's UL listed and FM approved ECARO-25 System is available worldwide, allowing the fire protection industry to return to many of the benefits that Halon 1301 originally offered.

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Utilizing PPV Technology

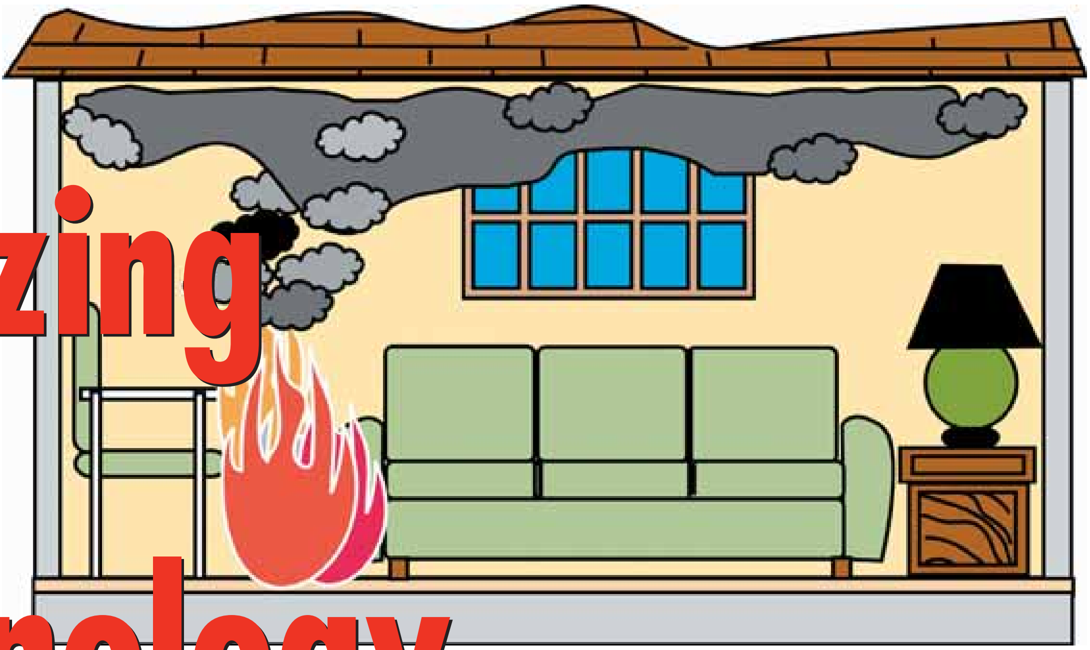

Figure 1. Fire creates its own air movement

By Roger Weinmeister

VENTILATION IN THE FIRE SERVICE – One of the most powerful tools in any fire departments arsenal is their ventilation equipment. Ventilation is essential for not only reducing property damage after the fire is extinguished, but even more importantly for improving life safety for both the firefighters and any victims of the blaze. It is this key element, Life Safety that has driven many departments to address the manner in which they ventilate on the fire ground. Historically there have been three types of ventilation used in the fire service worldwide: Natural, Vertical, and Horizontal.

Since the 1950s departments have realized that their job is much easier if they help the natural ventilation process. To do that requires additional equipment. Vertical ventilation is the process of making an exit for smoke and hot gases over the fire. This improves the visibility, reduces the amount of heat, and reduces the chance of flashovers. Horizontal ventilation has the many of the same advantages as vertical ventilation but is generally much easier to employee. Because of this, most all departments have standard procedures for ventilation of the structure after the fire has been extinguished. These include the use of fog streams and smoke ejectors to pull the smoke horizontally out an existing opening in the structure.

PPV BEGINNINGS

Starting in the late 1980s, some departments experimented with pressurizing a structure with a stream of air after the fire had been extinguished. This was called Positive Pressure Ventilation or PPV for short. The concept seemed to work quite well as long as an exit path was created for the smoke prior starting the fan. Eventually it was used during the firefighting phase of training burns. Using a fan to blow into a structure defies most sound firefighting theory. But it was found that the air did not have a significant effect on fire behavior. Figure 1 shows the physical reasons for this, that a fire creates its own air movement. Similar to a typhoon, oxygenated air is drawn in low and heated combustion products are expelled upward. The fan, if set right next to the seat of the fire would greatly increase combustion. But when the fans energy is spread out over the entire room, it only has enough power to create a steering force on the combustion products, much the same as a weather front might steer a typhoon. Departments new to PPV should, at first, only use it after the fire has been extinguished. This will help them to gain knowledge that can then be taught during training. To effectively use PPV as a fire department requires that a majority of the firefighters understand the concept and have been allowed to train with it prior to utilizing it in an actual fire.

Pic courtesy of Super Vac

UTILIZING PPV

With proper use, PPV can help in many ways. The airstream from the PPV fan is cooler than that in the structure causing a wedge of cool air to lift the smoke off the floor and start forcing it out the exit opening. This brings oxygenated air to any potential victims and reduces the heat they are subject to prior to them being located by firefighters. It also allows the firefighters to enter the structure with increased visibility so they more quickly find any

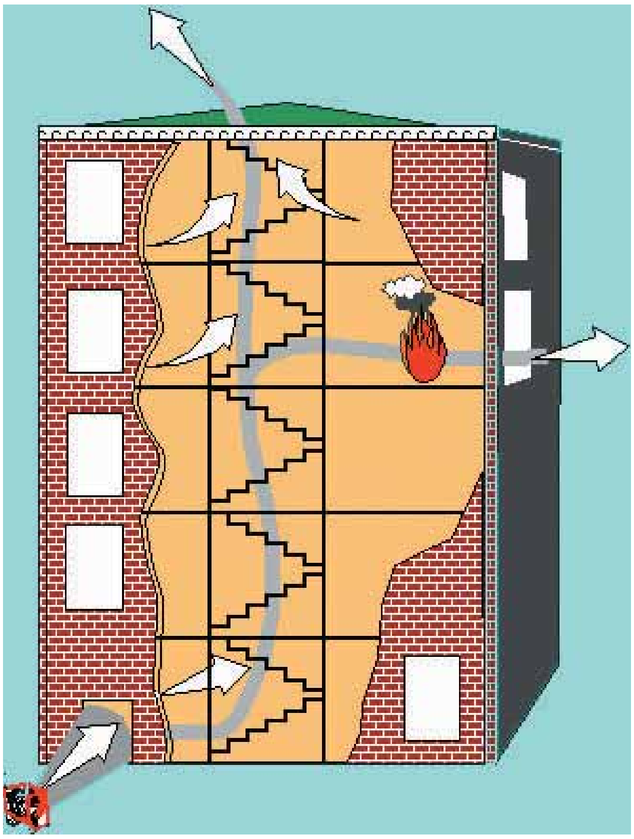

Figure 2. Proper placement of ventilation openings in a high-rise

victims and avoid hazards themselves. Care must be taken that the entry into the structure is coordinated with the ventilation and whenever possible, ventilation crews should take advantage of the smokes natural tendency to rise and any wind blowing at the time of implementation. Since PPV is initiated from the exterior of the structure, it can be placed in service immediately without entering the hostile environment. There are only a small number of situations where PPV should not be used. One of the times PPV should be avoided is in a potential backdraft situation. In such a situation, there is not a chance to affect a rescue on victims and vertical ventilation is required prior to setting up PPV. Other situations in which PPV can be of limited use include rooms in large buildings with limited access (nursing homes, prisons, etc.) and interior rooms in large buildings. These situations call for negative pressure ventilation to most effectively desmoke the room.

HIGH RISE VENTILATION

One of the most powerful applications of PPV is its use to maintain the conditions of stairwells. Stairwells are the main arteries of high-rise buildings. They are the means of egress for the occupants and the means of ingress for the firefighters. Many buildings have pressurized stairwells built into them. The use of PPV can assist in this pressurization or perform the task for systems that are not functioning due to fire conditions. To properly perform ventilation in a high-rise full of people, many firefighters are needed to police the ventilation corridors and prevent occupants from inhibiting ventilation by other opening doors and windows. Figure 2 shows the proper placement of ventilation openings in a high-rise. As with all firefighting situations, high-rise ventilation should be constantly monitored for effectiveness. If it is not working, evaluate the overall situation and correct the problems.

SHIPBOARD VENTILATION

Firefighting aboard marine vessels can be extremely dangerous. Ventilation is also more difficult in such situations due to the lack of external openings and congestion of the manways and corridors. The basics of shipboard ventilation are that pressurization and exhaust of gases must be to the weather deck. Incorrectly setting a single fan below deck may cause churning of the fire gases and hamper firefighting operations. As with high-rise ventilation, extreme care must be taken to police ventilation corridors. The problems aboard ship generally involve lack of openings or closed ventilation corridors. With sufficient practice, shipboard ventilation can allow fire crews to setup closer to the seat of the fire, with better visibility and less heat stress.

DECONTAMINATION

The use of PPV in decontamination can greatly aid your department. Much time and effort is spent on controlling water run off from a decon procedure, but the same detail must be applied to airborne problems. Making matters worse, showers can aerosolize a contamination. Placing a fan to gently pressurize a decon shower tent can assure the airborne contamination is forced back towards the hot zone and does not effect people or equipment in the cool zone. Utilizing PPV prevents minimizes the amount of equipment that is exposed to the hazards and must be decontaminated or discarded after the operation.

HAZARDOUS MATERIALS

Similarly, effective pressurization of a building can control internal contamination. Ammonia and chlorine leaks can create major problems for industrial users. Using PPV concepts, your department can help minimize the loss and down times for these industries. By controlling the airflow in manufacturing

> *Other situations in which PPV can be of limited use include rooms in large buildings with limited access (nursing homes, prisons, etc.) and interior rooms in large buildings. These situations call for negative pressure ventilation to most effectively desmoke the room.*

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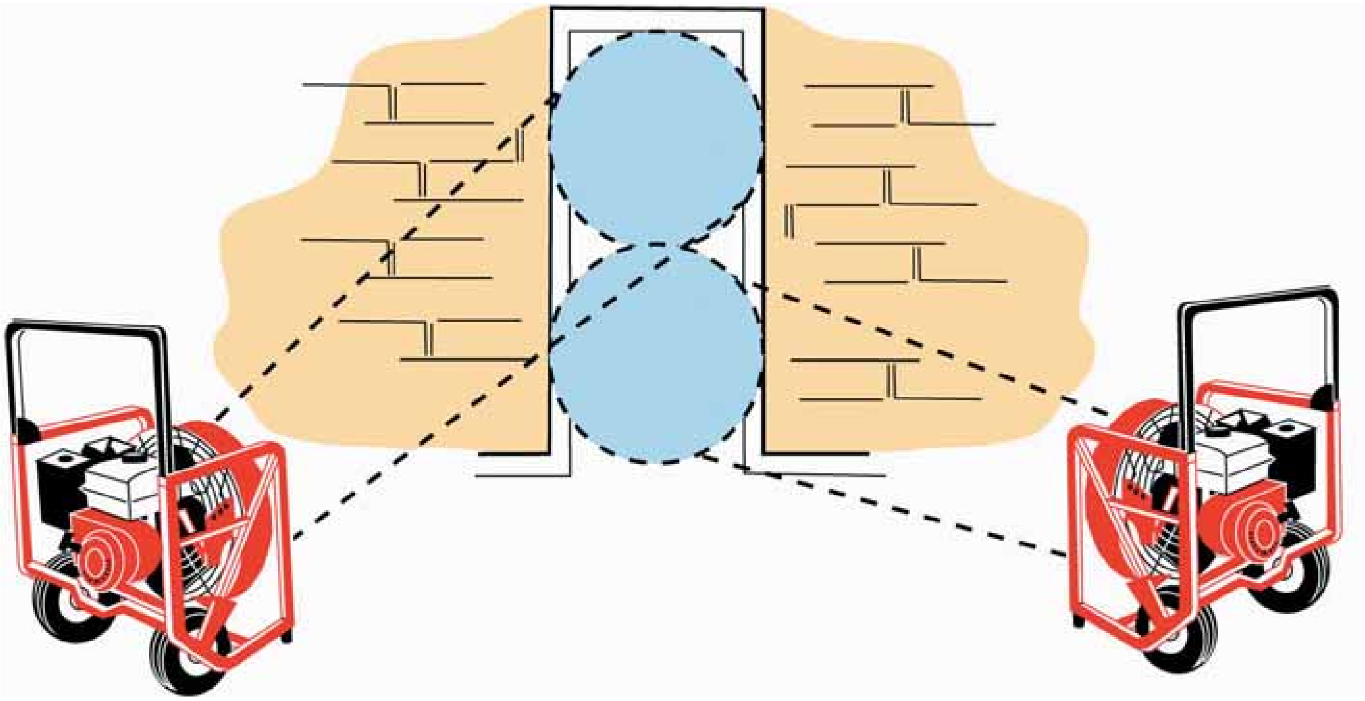

Figure 3. The use of a "V" attack increases the flow of air into the building to more quickly ventilate any contamination

or food processing plants, the amount of exposure to these corrosive chemicals can be controlled. The concepts of ventilation of these problems differ in the fact that there is generally no temperature differential and you must be aware of the downwind potential for contamination. It still requires that an exit opening be created as close as possible to the seat of the problem prior to starting pressurization. It again minimizes the amount of equipment that is exposed. And most importantly, the use of PPV helps protect the members of your department from exposure to hazardous situations.

FIREFIGHTER REHAB

With the increased protection from bunker gear comes the increased chance of heat related stress to today's firefighter. To set-up an effective rehab area, pick a location that is free of smoke and vehicle exhaust. Use shade trees, tarps and awnings to prevent sun exposure. Misting attachments can be added to provide additional cooling on the scene and at training sites. Be sure the fan is set far enough away from personnel that the mist is fully evaporated and does not wet down the people or their gear. If your department has electric fans, they are better for rehab because of their low noise.

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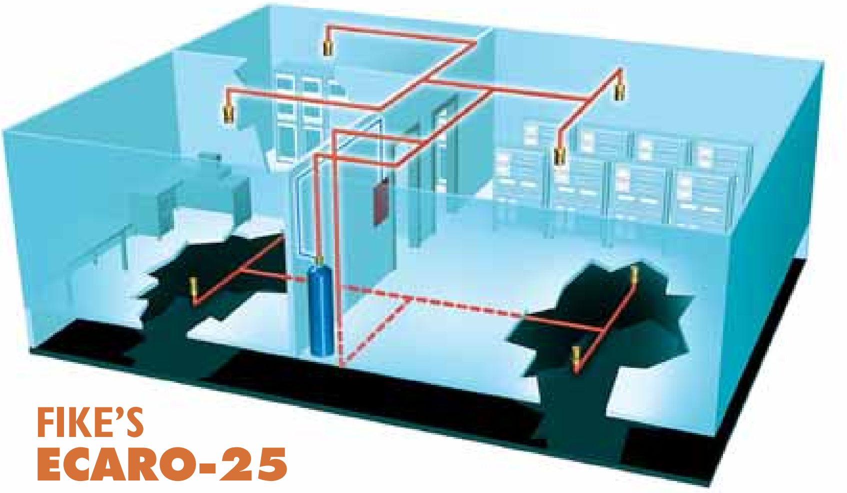

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CURRENT PPV TECHNOLOGY

Since the inception of PPV, departments have asked for increased airflow and ease of use around the fire ground. This has been accomplished by increasing the power of PPV units from an average airflow of around 10,000 m^3/hour to today's average airflow of over 20,000 m^3/hour. Most of this increase has been accomplished with better blade design and higher power engines. Since a Fire Truck is crowded with the tools required for the variety of responses, it is not generally possible to increase the fan diameter for increased airflow. There are exhaust extensions to remove the CO caused by gasoline engines from the airstream. These are very helpful once PPV has been embraced by a department and is being used in situations short of a full blown structure fire like burnt food on a stove, overheated bearings, or CO emergencies. Many fans now come standard with increased protection for the fan components due to the rough nature of firefighting. Large diameter tires are much more common to help with movement over large diameter hose or up stairways. Placement of multiple PPV fans is now much better understood also. The use of a "V" attack (Figure 3) increases the flow of air into the building to more quickly ventilate any contamination. It also allows the hose lines and firefighters to move straight into the building. Just as using two pumps in parallel moves more water onto the fire, two fans in parallel, moves more air into the structure.

> *Many fans now come standard with increased protection for the fan components due to the rough nature of firefighting.*

IMPLEMENTING PPV

The use of PPV for fireground ventilation can be phased in over time. It is important that a department practice with PPV after the fire first. As confidence is gained, the instructors can start teaching PPV to various groups within the department. If they only teach the incoming rookies, those rookies will get on a firescene and be overruled by the veterans. So instruct an entire group on PPV technology. Let them play with various scenarios. Time the ventilation of fake smoke with the veteran's method, then with PPV. The goal of a progressive department is to save as many lives as possible in the most difficult situation. By effectively using PPV in an aggressive manner, lives can be saved. Firefighters can avoid calling in the RIT team because they can see the buildings layout as they go in.

PPV can also help in property conservation by allowing firefighters to quickly find the seat of a smoldering fire. Structural firefighting will always be one of the most dangerous situations faced during your career, so use all of the tools available to make it easier.

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Firefighters attack a simulated fuel spill fire on a B-747 aircraft fire trainer at Schiphol Airport in the Netherlands

Kidde Fire Trainers

"KIDDE FIRE TRAINERS" IS LAUNCHED

Symtron Systems inc., Symtron GmbH, ICS International Code Services, and IFTE International Fire Training Equipment Limited are now offering their products under the name "Kidde Fire Trainers".

Acquired by Kidde plc in September 2003, the group of companies is now the leading provider of live fire training systems and centers for firefighting, with offices in the USA, UK and Germany. Kidde Fire Trainers offers the broadest range of products to meet any fire training needs and will be in a position to provide more timely support services on a global basis. Kidde training systems include fixed and mobile aircraft trainers, fixed and mobile structural trainers, outdoor and industrial trainers, maritime trainers, and portable pan fire trainers. Kidde also offers design assistance and extensive support services. With more than 25 years of live-fire knowledge and not a single safety accident, Kidde Fire Trainers has the experience that instills confidence to go along with a truly reassuring safety record.

Kidde has a reputation for delivering innovative training systems, reliably installed on time and within budget. Kidde's training systems, controlled by computer and fueled by propane or natural gas, allow realistic fire training in a safe and environmentally sound manner. Gas-fueled, computer-controlled systems offered by Kidde enable fire fighters to create unique fire scenarios that are not easily replicated with conventional live fire methods. The computer-control system creates real training fires, and continuously monitors and regulates the atmosphere within the training space to keep it within acceptable limits. Fires are initiated and, more importantly, can be extinguished by the instructor at the touch of a button. In an emergency situation, the control system automatically extinguishes the fire and ventilates all heat and smoke. The instructor can also do the same by hitting an emergency stop button.

While realistic, safe training is paramount, proper steps must be taken to ease the burden on the environment. Kidde's training systems have minimal environmental impact, and relieve community and legislative concerns of air pollution and water contamination. Fire can be fueled by clean-burning natural gas, propane, or butane and the simulated smoke is environmentally benign. Kidde fire training systems have been widely adopted by municipal, airport, and industrial fire departments as well as military and maritime fire training organizations worldwide.

Kidde Fire Trainers has delivered more aircraft fire training rigs than any other supplier, worldwide. Key airport customers include: London Heathrow, Schiphol, New York-JFK, Frankfurt, Berlin, Athens, and most recently Gatwick Airport. Additionally, Kidde Fire Trainers is a proud sponsor of the International Aviation Fire Protection Association (IAFPA). Since the acquisition by Kidde PLC in September 2003, Kidde Fire Trainers has been wrapping-up a number of high-profile projects around the world.

Construction and installation of an Aircraft FireTrainer® for the Port Authority of New York and New Jersey is underway that will enhance the emergency preparedness of the airport firefighters at three New York area airports. Kidde Aircraft trainers feature realistic, challenging interior and exterior fires, while offering standard or custom designs to meet any particular ARFF training needs. The Aircraft FireTrainer® for the Port Authority is being installed alongside the Fuel Spill FireTrainer® A-2000 that was installed in January of 1998.

At Gatwick Airport in the UK, a new aircraft fire trainer is nearing completion. The training system features 36 training fires in and around the full-sized B-747 mock up. Varying fire scenarios such as main cabin galley fires, passenger cabin seat fires, fuselage fires, wing and tail engine fires, inner and outer undercarriage fires and fuel spill fires can be created. The training system meets the international standards for firefighter training.

Two fire training systems were recently installed for the Brigade Sapeurs Pompiers Paris. The structural fire trainer at Paris – Villeneuve-St. Georges is designed for basic training. The trainer at Paris – St. Denis is designed for more advanced fire training.

At Amsterdam Airport Schiphol in the Netherlands, a full sized B-747 aircraft fire trainer that contains 20 separate computer-controlled training fires was installed. The trainer includes a large fuel spill fire simulation.

Kidde Fire Trainers is part of the Kidde plc group, a leading global supplier of fire and safety products, systems and services to industrial, commercial, aerospace, combustion control and retail customers.

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A Kidde Company

THERMAL IMAGING

BULLARD THERMAL IMAGING CAMERAS

The Bullard line of thermal imagers has developed an enviable worldwide reputation and leads the market in the US and continental Europe. Since the introduction of the company's first thermal imager in 1998, Bullard has captured the lead position within the thermal imaging industry in the US, with thousands of units in the field.

Product Line Overview

Bullard Thermal Imagers are known widely to offer the greatest durability and the most practical features, backed by the best training resources and the highest level of support available on the market. From the most basic personal issue thermal imager to the most advanced command unit, Bullard offers firefighters what they need to get the job done, at price points to meet the needs of every fire department.

Bullard TI Commander

The Bullard **TI Commander**™ borrows its tried-and-true design from the original Bullard TI, with an engine based on proven high resolution Raytheon BST technology. This analytical thermal imager, which comes standard with a 5-inch backlit display, offers many innovative and highly useful optional features, including digital 2X zoom, digital image capture, Relative Heat Indicator (RHI), thermal throttle, enhanced internal battery charging system, and custom startup graphics. The TI Commander offers the same foolproof simplicity and uncompromising durability that has made Bullard the top choice of firefighters around the world.

Bullard T3 Series

With the simplicity and durability of the original T3, the Bullard T3LT™ incorporates an upgraded Raytheon Amorphous Silicon engine for image clarity and picture definition, as well as a Relative Heat Indicator (RHI) feature to provide on-screen temperature measurement. The Bullard T3MAX™ offers the same design features as the T3LT and provides customers with the clearest possible picture and crystal-clear fire scene imagery. The ultra-high performance BAE Systems Vanadium Oxide microbolometer engine in the T3MAX provides heat indication features such as an advanced Relative Heat Indicator (RHI™) for on-screen temperature measurement and a Red-Hot™ feature that colorizes high heat objects.

Bullard T3MAX™

Company Background

Founded in 1898, Bullard is a leading manufacturer of personal protective equipment and systems worldwide. Product lines include thermal imaging cameras, hard hats, fire fighter and rescue helmets, supplied air respirators, powered air-purifying respirators, and air quality equipment. Bullard is headquartered in Cynthiana, Kentucky.

For more information, please contact:
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Fax: +1 859 234 6858
Website: www.bullard.com and
www.thermalimager.com

INTRODUCING ARGUS®3 FROM E2V TECHNOLOGIES

Introducing some of the latest technological developments in the world of thermal imaging, Argus®3 hosts a range of new features

Picture this:

Capture the Image: Argus®3 is capable of taking up to 26 photographs at the scene of a fire. Later downloaded to a PC or laptop for analysis, the images can capture vital forensic evidence before it is destroyed.

New: Thermal images are displayed on a 4-inch full colour LCD display. Sixteen colour settings allow the user to set their own preference.

Argus®3 is a camera of choice as a fire fighting and rescue tool. In addition to the features above, it also offers as

CAMERAS ROUNDUP

standard: x2 digital zoom (for clearer scene assessment), ambient temperature measurement and on–screen graphics including time/date, battery status, transmitter status/channel, and camera condition. Company logos can also be uploaded for improved asset tracking.

Argus®3 features also include:

- **Spot temperature measurement: This enables customers to identify and measure heat source temperature, so aiding assessment of the fire scene.**
- **Telemetry: Transmitter and receiver modules enable live video to be viewed remotely. Argus®3 – allowing better control of operations.**

Andre Goodson, Business Sector Manager at e2v technologies, is confident that *Argus®3* is a technological step forward: “We have been working closely with our customers to develop a thermal imaging camera to meet their demanding professional needs. Many unique features have been incorporated into the new camera, for example image capture, giving firefighters new capabilities at the scene of a fire. *Argus®3* is a high technology solution to assist the firefighters to carry out their job as safely as possible, at an affordable price.”

Supplied with remote control for set-up, side straps, rigid handles, neck strap, end-user software, rechargeable battery packs and waterproof carry case, *Argus®3* is a complete product package centred on a unique design philosophy. Building on the achievements of its predecessors and incorporating significant user input, e2v technologies’ *Argus®3* is setting high standards for performance, flexibility and ergonomic design.

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SMALL, COMPACT EVOLUTION 5000® TIC IS TOUGH NEW FIRE SERVICE TOOL

MSA’s new Evolution® 5000 Thermal Imaging Camera delivers durability, functionality, and performance in a compact 3-pound firefighting tool.

It’s customized 160 x 120 vanadium oxide Microbolometer (from Indigo systems) makes the Evolution 5000 TIC the first small-format TIC to incorporate the proven high-performance vanadium oxide technology previously found only in larger-format TICs. And it provides other features and performance not found in other small TICs.

MSA Evolution 5000

Performance features include a 30 Hz frame rate, Optional Heat Seeker and Quick-Temp indicators, and a breakthrough new lithium ion battery pack that provides long run time in a lightweight package.

The small tool can be conveniently anchored on the firefighter’s belt when not in use. Several carrying attachments are available for easy integration into the firefighting ensemble. Other key features include desktop- and optional truck-mounted charging capability, high-strength rubber bumpers, and a flexible secondary handle for more durable handoff.

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SCOTT HEALTH & SAFETY

Scott Health & Safety Announces the New Eagle Imager, 160 Next Generation Thermal Imaging Camera

Scott Health & Safety, a unit of Tyco Fire & Security, today announced the introduction of the Eagle Imager 160 thermal imaging camera that features a specially designed, high-resolution core technology and a versatile form factor permitting user-selectable hands-on, hands-free or crawling configurations.

The Eagle Imager 160 contains the first vanadium oxide core of its kind

Scott Eagle Imager 160

and it is available only from Scott. Produced for Scott by BAE Systems, the new "Fire-Cooled Microbolometer"™ produces clear, crisp images under all conditions, including high heat environments where less robust cameras white out. Also, unlike cameras with more limited performance, the new core generates images free of ghosting or halos.

The new core camera features a 160 x 120 focal plane array, unique in its ability to produce images comparable to more expensive cameras with larger arrays. The core also has a 60 Hz. update rate for smooth image generation without the choppiness seen in cameras with slower update rates.

"This is the first microbolometer thermal imaging camera of its kind and we expect it to revolutionize the industry," said John Skaryak, Scott's Fire Service Marketing Manager. "In the past, microbolometer based cameras have been too costly for many fire departments. The Eagle Imager 160 will provide fire departments with cutting-edge technology at an affordable price."

The Eagle Imager 160 features streamlined packaging to achieve maximum ergonomic handling qualities. A specially designed "Twist Change"™ set point adjustment mechanism allows the user to set the camera's handle position in any of three positions.

Designed for optimum balancing, the camera may be easily and securely handed off from one user to another by grasping its handle, battery compartment or side straps.

The camera housing is constructed with a special "HHRP"™ (Hit & Heat Resistant Plastic) blend of glass-filled nylon. This material provides a tough, fire-resistant housing capable of surviving repeated exposures to high heat environments, plus the wear and tear associated with firefighting.

The camera's four-inch diagonal screen means that several firefighters can easily observe images simultaneously. The large format screen also serves as a beacon for nearby firefighters in dark or smoke-filled environments.

Options available on the camera include an on-screen temperature scale for use in such applications as identifying hot spots or fire extension and a four-channel wireless transmitter.

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THE FUTURE OF THERMAL IMAGING IS ALREADY HERE!

Many articles have been written recently about the "ultimate" thermal imaging solution consisting of the incorporation of a TIC into an integrated fire helmet.

Such a solution has been available for six years from GB Solo Ltd., of Scunthorpe, U.K.

The SOLOtic is the ONLY fully integrated fire-fighting helmet in the World, incorporating breathing apparatus, face-mask, thermal vision and crystal clear communications – 3rd generation SOLOtic.

This is the ultimate tool for the worst imaginable conditions!

GB Solo SOLOtic

In addition to civilian Fire Brigades, SOLOtic, along with the SOLOunifit, has continued to find its place in the specialised markets such as Cruise Liners, Commercial Shipping Lines, F1 Grand Prix teams, Oil Refineries, Tunnel Operators and Naval Forces around the World.

The SOLOvision FIRE is unlike any other thermal imaging camera. It can be used as a traditional hand-held or as a hands-free camera that has the unique ability to attach to, and create a seal with, the BA face mask to prevent any smoke, steam or dirt interfering with the picture display.

But how can SOLOvision's, and SOLOtic's camera display be positioned so close to the eyes without blurring and distortion of the image, as would occur with any other TIC?

All GB SOLO cameras operate with a patented display system. GB Solo processes the image from the camera sensor, using a Virtual Reality computer, so that the image presented to the user's eyes is 1 metre square and is augmented with the users head. What the user sees is as though he/she were using their own eyes rather than that of the camera. The result is a perfect image – more than 60 times larger than the image seen through a TIC with only a 3″-5″ display – and two hands free to work with!

SOLOvision also happens to be the lightest TIC in the world, weighing in at only 850 g in its heaviest configuration, the new Hand-Held, operating on 6 x AA batteries.

All cameras have the option of colour display, spot temperature and wireless transmission.

Recent Asia/Pacific orders for GB Solo helmets and cameras have come from Singapore S.C.D.F.; Korean Fire Department; various Fire Departments in China; and the Malaysian Armed Forces.

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Scott's New Eagle Imager® 160 Thermal Imaging Camera is

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Built for severe firefighting conditions, with a rugged high performance Hit & Heat Resistant Polymer™ (HHRP) outer shell.

Innovative Twist-Change™ Adjustment offers multi-position viewing of the large-format 4" high-resolution screen.

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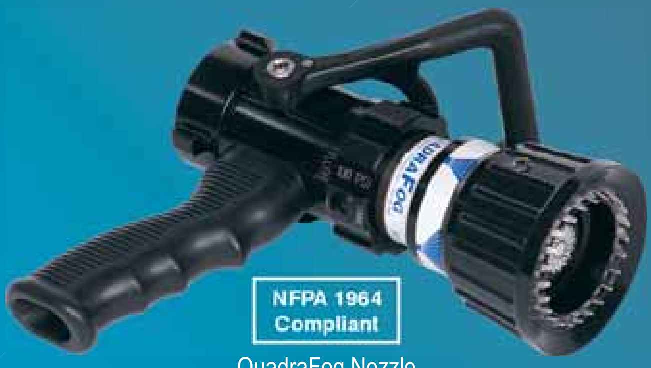

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History of the Fire Pump

By David Burton
Hale Products Europe

The Coventry Climax FF Trailer mounted fire pump, circa 1940s

THE FIRE PUMP IS dedicated to discharging water for fire extinguishing. There may be many variations to the basic design but its essential purpose remains the same – the fast and efficient suppression of fire. To achieve this fire pump manufacturers are constantly seeking designs that will maximise output, increase efficiency while reducing size and weight.

The evolving design of fire pumps parallels the development of industrialised society. As competing nations harnessed scientific discovery for practical applications the rate of industrialisation and population growth expanded dramatically, especially in Western society. Extensive travel, larger towns and cities with taller and more complex buildings all became commonplace, the need to protect this way of life became an increasing concern. The role of the two World Wars in the last century must also be acknowledged as a driving force for change. Conflict inevitably forces the search for the latest technology, for the more efficient and the more effective in the fight for supremacy.

EARLIEST FIRE PUMPS

The earliest fire pumps were adaptations of the positive displacement pump, commonly known as stirrup or lift pumps. The motive power for these pumps was the fire fighter themselves and the water discharge rate very limited. It was not until the invention of the centrifugal impeller powered by a steam or internal combustion engine that the fire pump began to develop the output required to extinguish fires with greater flow and volume than before.

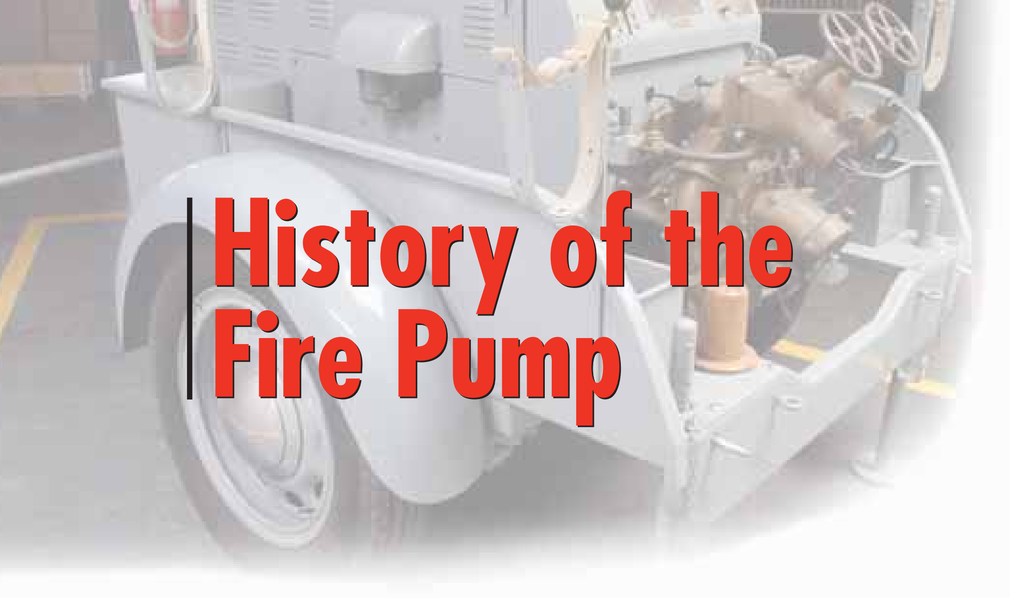
The centrifugal fire pump was first refined and manufactured on an industrialised scale by various European and American companies in the first part of the last century. Among these was the Hale Company of the USA.

Hale produced its first fire pump design in 1914, the result of collaboration between three Pennsylvanian firemen. The involvement of fire fighters in pump design has always been a key to the products development and with the Hale Company this has always been the case. The Hale Company's centrifugal pump designs proved successful and by the 1930s were producing fire pumps for their own appliances and other fire vehicle manufacturers.

One of these manufacturers was the Coventry Climax Engine Company. From the early 1920s this company had built a reputation as a supplier of automotive engines for the various car manufacturers in the UK Midlands. In 1937 Coventry Climax decided to enter a bid for a UK government contract – supplying trailer mounted fire pumps for the civil defence sector. The company's decision to offer a design that combined the power and reliability of the Climax engine with the Hale centrifugal pump design was to initiate a design legacy that would dominate and influence fire pump design for the decades to come.

The first pump designs were an instant success with the fire fighting fraternity – the FSM trailer pump powered by an 8 h.p. side valve engine, capable of delivering 545/997 L/min and subsequently the FF model, again a trailer unit using a 20 h.p. sidevalve engine with an output performance of 500 Igpm (2.273 L/min). These units set the standard for all fire pumps used by the British Government to meet the problems of the impending war. No less than 25,000 pumps had been supplied by the time hostilities ceased and they were undoubtedly a major factor in the survival of Britain.

History of the Fire Pump



DEVELOPMENT OF LIGHTWEIGHT PORTABLE PUMPS

Building upon the success of the wartime experience, Coventry Climax then progressed the development of a truly portable fire pump with the introduction of aluminium as a weight saving material. The resulting pump, the FWP featherweight portable pump, exceeded the requirements of another demanding government contract and became widely used by the UK fire brigades. The FWP was capable of discharging 1364 l/min at 7 bar and was able to be carried by 2 men.

From the late 1950s Coventry Climax engines were also becoming a dominant force in racing car competitions. The Climax engine enjoyed considerable success in the Formula 1 and Formula 2 categories, peaking in the 1965 World Constructors' Championship with the Climax powered Lotus car. The experience gained in motor sport would then be applied to the portable fire pump, and so successful were these portable pumps that a new company was formed – Godiva Fire Pumps.

From the 1970s onwards Godiva Fire Pumps began using other manufacturers' engines as a power source for their pumps, utilising the best available lightweight aluminium engines, such as Honda and Briggs and Stratton units.

Today the lightweight portable pump is an essential part of the firefighter's equipment, it is a versatile unit playing many roles – supplying water from open sources to the main vehicle pump, as a back-up to the main pump and as a pump to relieve flooding. There are increasing demands for a portable pump to be lighter, more compact and still give a powerful performance. Portable pumps are now available with piston prime, hand prime or the long established exhaust gas ejector system. With the use of vacuum and pressure gauges to guide the pump operator, quicker priming and more efficient pump operation is possible. In addition portable pumps are now able to incorporate features such as electric starting and lighting.

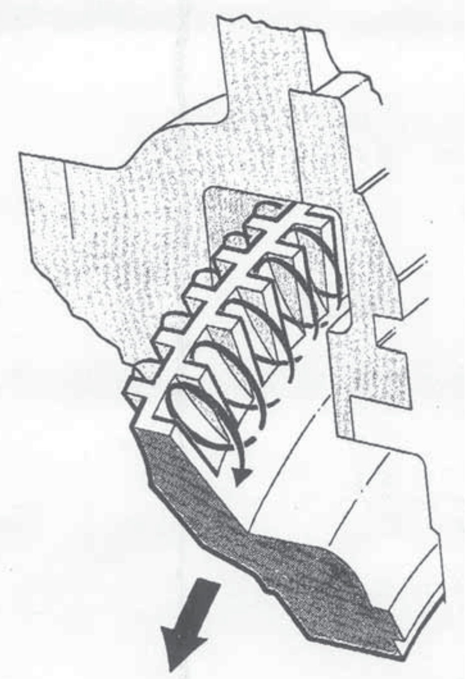
The performance and standard of portable pumps available for firefigthers continues to improve mainly due to the combination of customer's expectations, competing manufacturers and the introduction of exacting European standards.

VEHICLE MOUNTED PUMPS

During the 1950s the majority of fire pumps were manufactured in bronze, particularly the trailer and vehicle mounted versions, but again it was Godiva who pioneered the use of lightweight aluminium for pto driven pumps on fire appliances with the introduction of the UFP range. The introduction of another key feature for vehicle mounted pumps – the Automatic Water Ring Primer – made the fireman's task simpler when priming the pump.

One of the most significant innovations in fire pump history was the introduction of the multi-pressure vehicle pump by Godiva in 1968.

The advantages of high pressure derive from just after the Second World War, when work was undertaken to provide a pump to give a higher pressure than the current 7 bar type performance. The logic behind this is that if the water droplets are made smaller, the larger water surface area will lead to enhanced heat transmission and thus more rapid cooling. Not only this, but the fine mist evaporates more quickly



The regenerative, or peripheral impeller, used to generate high pressure discharge

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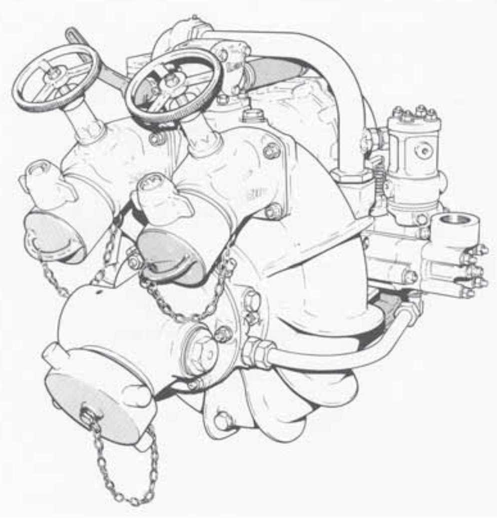


The Godiva UMP multi-pressure pump

and forms a steam layer that effectively reduces oxygen at the fire interface. This means that the flames are effectively smothered.

The nozzle fitted to the hose can be used to produce a cone of water for the attack and at the same time an umbrella shape that forms an effective heat shield in front of the fire-fighter. Also, the electrical conductivity of a high-pressure fog is virtually zero.

As the water is used more effectively, there is less water usage in a typical fire when compared to using standard nozzles – a vital point where water supplies are poor and water has to be used to maximum effect. Advantages to the operator are in terms of safety, speed and efficiency of operation. Public advantages are quicker extinguishments, less water damage, less property damage and more rapid return to normality.

Early systems used a separate PTO driven high-pressure pump. This was designed to be mounted separately to the main pump but produce a flow of say 250 l/m at 30+bar. The success of the application was proved and this unit entered service in the mid-late 1950s.

However, it involved a more complex engineering installation in the fire truck and that led manufacturers to look at the possibility of producing the two pumps in one casing and making the world's first 'multi-pressure' fire pump.

For ease of design, the first units used a single low-pressure impeller and a single high-pressure impeller. However, to mount them on a common shaft would not be possible with a conventional impeller so a regenerative high-pressure impeller was used. This design injects considerable energy into the water stream rapidly and thus enabled the high-pressure output from a simple and compact design.

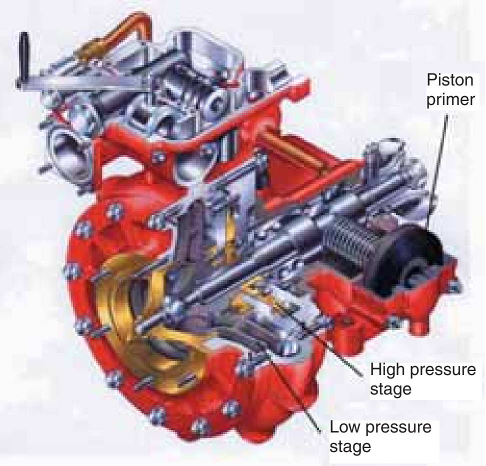
It was also essential that engagement of the high and low pressure sections of the pump was simple and that it could be achieved at all operating speeds without the need to stop pumping operations. So a typical attack would start with high pressure and the low pressure would be activated if there were a demand for additional water in the event of a major fire.

Other design essentials were simple operation – a simple ball valve activated/deactivated the high pressure, automatic priming system and a pump that needed no maintenance during operation, this led to the incorporation of an automatic maintenance free mechanical seal on the pump shaft.

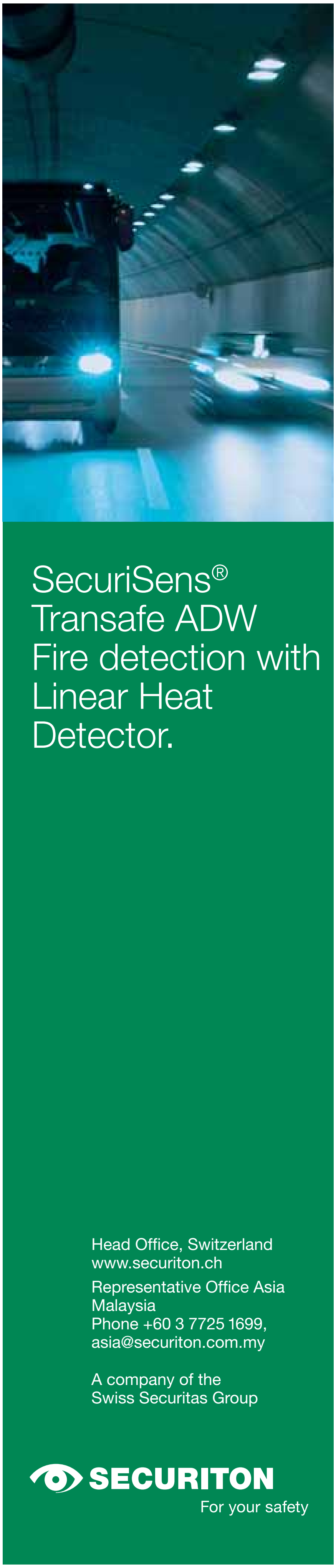
The first pump to include all these features was the Godiva UMP universal multi-pressure pump.

This rapidly became the pump of choice for many fire brigades and results were impressive. By using high-pressure fog attack, many brigades were reporting that this was the only method of attack in 80% of fires! An impressive result that attested to the effectiveness of high pressure fire fighting.

In other countries, high pressure was less quick to be accepted. This was for a number of reasons including national standards etc. Other manufacturers eventually started to produce multi-pressure pumps that were based on their current design but with additional impeller stages. However by using standard type impellers this often necessitated up to 3 high-pressure impellers on the same shaft and this led to a much longer overall pump. Another method was to use a separate pump mounted above the main pump and driven by gears with an electro-magnetic clutch for activation but again this leads to a much physically larger pump. A compact pump is necessary as the space on



Godiva World Series Pump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a fire truck is limited and with the necessity to carry a wide variety of equipment e.g. rescues tools etc. space is at a premium.

Godiva continued the success of the UMP with the GM range and the all-new Godiva World Series multi-pressure pump recently superseded this.

INNOVATION CONTINUES – COMPRESSED AIR FOAM

Fire pump manufacturers are always seeking innovations, currently a leading development is compressed air foam or CAFS. The mixing of foam and water and then the injection of compressed air has been available in a basic form since the late 1940s, but the equipment was large and inefficient.

It was only in the late 1980s that manufacturers began offering smaller, more reliable equipment to discharge CAFS. The advantage of CAFS is that it produces a wetter foam/water mixture, a more efficient fire suppressant. Less water is used, causing less water and environmental damage in the extinguishing process.

Once again Hale Products and Godiva are in the forefront of fire pump design with a range of CAFS units for different applications.

Compressed air foam systems can be supplied with vehicle mounted pumps as one integrated unit, as a self-contained retro-fittable unit for existing appliances or as a package of engineered components to be installed in a vehicle at build stage.

Increasingly pumps are offered with state-of–the–art electronic instrumentation and control functions – features designed to ensure the fire-fighters task is completed quicker and with greater efficiency.

More than ever before Fire Pump design is a continuing search for increased power and more effective methods of extinguishing fire.

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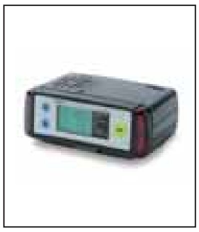

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Pic courtesy of Simulation

By Matt Youson

Live fire training rigs are a growth market in which solutions are increasingly bespoke, flexible and environmentally acceptable

THE LAST THREE YEARS have inevitably seen the emergency services come under greater scrutiny from government, media and public alike and while fire chiefs will argue that their level of readiness has always been elevated, most will also agree that extra funding post 9/11 has allowed an intensification of the training cycle, pushing the boundaries of preparation to new levels.

Emergencies by their very nature are difficult to predict, a fact that fire fighters around the globe seek to counter with incessant, repetitive training. While such preparation is the cornerstone of professionalism on which all fire fighting services rely, this throws up distinctive challenges for specialist crews.

Most emergency services around the globe subscribe to the axiom that there is no substitute for experience. The cliché is entirely valid but creates its own problems for those fire fighters training for a once-in-a-lifetime situation. Unlike domestic fire fighting where a continuous stream of real world situations serves to hone the skills of the crew, experience for a specialist crew – for example tasked to fight fires in aircraft, ships or petrochemical installations – has to come in the form of simulation. The task for training providers is to make that simulation as realistic as possible.

The crews staffing the fire station at airports, on board ship etc., are training for a situation that may never arise. Nevertheless they must be ready for a variety of scenarios and repetitive training is the only method to adequately prepare them. Each faces a unique set of characteristics for which generic firefighting techniques would be inadequate, making conventional training methods of little use. An increasing tempo to training regimes has seen strong growth in the demand for live-fire test rigs.

Pic courtesy of Simulation

Since the late 1990s the market has seen exponential growth. The perceived threat from terrorism is an obvious contributory factor with many of the long-standing markets for hot rigs ostensibly vulnerable to attack, though there are many catalysts for growth to be found in much less malign circumstances: the volume increase in low-cost civil aviation and the development and upgrading of airport facilities to accommodate it for example.

Whether the application is civil or military and based in aviation, marine, industrial or another industry, the core technologies to be found in live-fire simulators are essentially identical. The bespoke nature of the work, however, ensures that any desired configuration of the outer shell can be catered for: from a Boeing 757 to a light aircraft; a complete firehouse to a fire attack unit; or a ship's compartment through to a whole multi-deck ship. Extremely common are hybrid configurations, such as the multi-purpose military aircraft simulator designed for the UK Ministry of Defence and installed at the MoD's Fire Service Central Training Establishment (FSCTE) at Manston, Kent. The unit, believed to be the largest hot fire aircraft training simulator within the MoD

al Thing

Pic courtesy of Simulation

features a main fuselage based on that of a wide-bodied civil aircraft but also incorporates elements of a Tornado fighter aircraft, a Hercules transport plane and, bizarrely, elements of a Sea King helicopter.

The majority of live-fire rigs have a basic structure composed of substantially reinforced steel plate. Thick walled box sections are used for the support construction and are extensively braced. The rig is then fitted out with various fuel burners that simulate a variety of possible fires – or scenarios as the fire crews call them. Increasingly common, particularly for aviation applications, is the commissioning of a dual fuel rig. Bodies responsible for safety certification, for example the UK's Civil Aviation Authority (CAA), frequently require fire fighters to train with 'realistic' fuel fires. In the case of the CAA the obligation is for these training simulations – using kerosene – to be carried out at least once a quarter. While training fire fighters to combat pressurised fuel-fed fires is served most realistically by using fuels

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of this type, such methods carry an environmental burden that is becoming increasingly unacceptable.

The many ecological problems associated with the use of carbonaceous fuels make it the bugbear of the Green lobby, and so outside of the quarterly requirements the industry is leaning in favour of training with liquefied petroleum gas fires. While LPG lacks the thick black smoke and atomised fuel cloud characteristics of kerosene, its relatively clean burn with little or no smoke output makes it more acceptable to environmentalists. By and large fire chiefs have acquiesced to the need for compromise and therefore airport authorities keen to dispel perceptions of environmental recklessness see the dual-fuel rig as an eminently attractive option.

The simulator at Nottingham East Midland Airport in the UK is a good example of the breed. Dimensionally modelled on a Boeing 757, the rig features seven LPG- and eight kerosene-fuelled scenarios. It will simulate an underwing or rear fuselage engine fire, underwing and undercarriage fires and several scenarios in the main fuselage. Kerosene is delivered from a pressure vessel, the pressurisation of which is obtained by using breathing apparatus cylinders that are recharged with the fire stations own compressor. The pressurised kerosene is then distributed via a manifold once the master control console has been enabled and all the safety systems operated correctly. LPG is stored at pressure in its liquid form in two 4,000-litre vessels. All the scenarios have a pilot ignition system and these are ignited using a lighting lance prior to the exercise commencing. LPG in its vapour phase drawn off from the top of the storage vessels is used as the fuel for the pilot lights.

While the rigs themselves are necessarily robust, the nature of an intensive training regime does little to promote longevity. The solution employed by one leading rig developer is an innovative water-cooling system designed to extend the service life of its equipment by pre-drenching the structure with a protective layer of water. At Nottingham the drenching system that protects the fuselage uses water pumped from one of the airport fire fighting vehicles. The 10,000-litre capacity of the tender translates into an operating time on the rig of something over ten minutes. The piped system terminates in a series of spray nozzles on top of the fuselage which establish a film of water around the body, while similar nozzles spray the top and/or outer surfaces of the wing and wing engine.

Pic courtesy of Simulation

The water-drench system requires 30 seconds to pre-drench the rig prior to the running of a scenario and a post cooling time of one minute. With individual burns limited to three minutes (in a real incident the fire-fighters would expect to have a fire under control in less time) it uses water at a rate that will allow a minimum of two exercises to be run back to back from one tender.

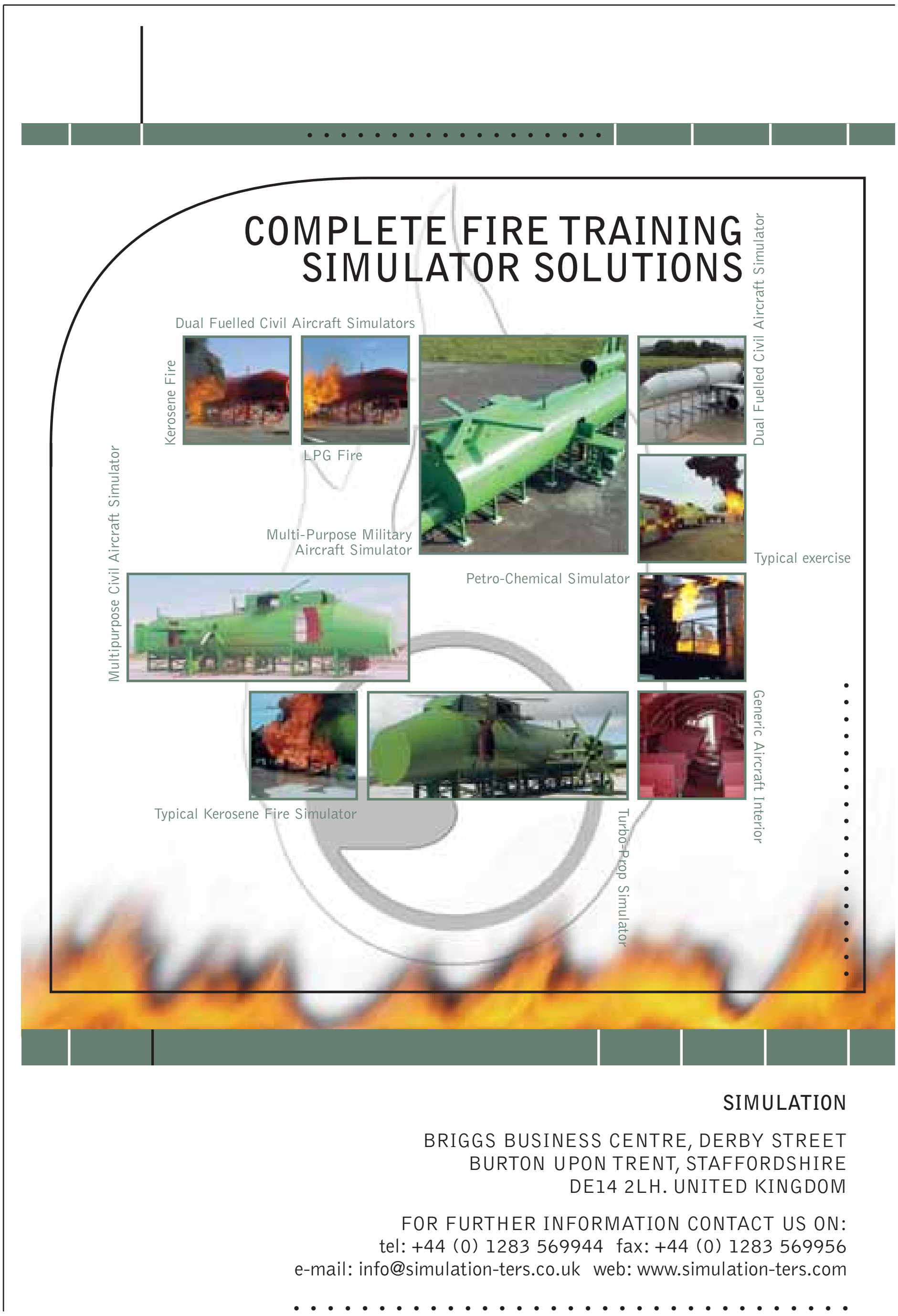
In one of the latest rigs to enter service the role of water-supply is very different. The National Maritime Training Centre in Ireland has spent US$100 million building a world-class naval fire training facility that will provide comprehensive training to over 800 students per year. The Centre, due to officially open in October 2004, is already drawing delegates from all over the world to view the wide-ranging training facility which includes one of the most innovative and realistic ships simulators available for naval fire suppression training anywhere in the world.

Located in Ringaskiddy, County Cork, the Ship Fire Training and Damage Limitation Unit is a combined rig that will allow trainees to perform fire and rescue training as well as damage limitation and repair to a breached engine room. The rig simulates three decks of a ship and has been designed to provide an engine room together with accommodation areas including mess and sleeping facilities. Of the four possible pressurized fuel fires simulated by the rig, three (engine, a cooker and a bed fire) burn natural gas while the fourth, again based in the engine room, is a kerosene fire.

Via a series of internal corridors and external walkways the fire simulator connects to the damage limitation unit where five installed fracture points allow instructors to simulate engine room water ingress based on wall fractures, hatch seal failure and high level fire main fractures.

The market for live-fire simulation equipment has been worth an estimated billion US dollars over the last five years and projections for the second half of the decade suggest this figure will be superseded. The nature of the business, however, is set to change, with hot-training rigs moving into smaller and more specialised niches. The high capital expenditure required sees equipment designers increasingly looking at new ways to allay the high up-front cap-ex costs of commissioning equipment.

Alongside the innovative solutions that have come along such as a Transportable Aircraft Fire Training Simulator and the Mobile Fire Truck which can be transported from venue to venue, many fire services are now looking into possibilities of developing a modular approach to fire ground provision whereby a long term plan sees an initial rig installed with a master control panel and fuel storage and delivery systems capable of accommodating a total of three, four or five further rigs in the future.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microphones. According to the perceived sounds, he indicates to his team-members the placement that is as near as possible to the victim, until locating him except for the meter.

The Vibrascope®BVA-6 enables disaster rubble to be searched and for victims to be contacted via a microphone incorporated in the camera. It comprises a telescopic pole at the end, which is an infrared camera, which can rotate 360 degrees, together with a portable screen monitor. This equipment makes it possible to explore the debris and to speak to a possible victim via a microphone incorporated in the pole.

For example, at the time of an earthquake, a person is buried, he manages to emit sounds but nobody succeeds to locate it. The team equipped with a Vibrascope®BVA-6, works in binomial: The coordinator, who has the audio and video return of the pole, indicates to his team mate if he may advance or move back so as to position the pole until locating as best as possible the victim. Once located, it is then possible to communicate with him, to know if he is wounded, to reassure him until the rescues succeed in releasing him from the debris.

The range of uses for the Vibrascope®BVA6 vary from rescuing buried victims to surveillance and maintenance techniques for customs examinations, even archaeological investigations. . . .

For more information, please contact:
Groupe Leader
Tel: +33.235.53.05.75
Email: export@groupe-leader.fr

CROMWELL F600 HELMET MAKES HEADWAY IN CHINA

The Tianjin Public Security and Fire Bureau in China has selected the British made Cromwell F600 helmet as part of a PPE modernisation programme that includes helmets, clothing, boots and breathing apparatus.

The 'jet style' F600 helmet, manufactured by Helmet Integrated Systems Ltd in Stranraer Scotland, is now used by over 50% of UK Fire Services, including London, West Midlands, West and South Yorkshire, and more recently has been selected by the South West Consortium of Cornwall, Devon, Dorset, Somerset and Wiltshire.

Tianjin, a city of over 5 million people, close to Beijing, is a rapidly expanding industrial centre, which has attracted investment both locally and internationally, with industries ranging from petrochemicals to electronics. In common with other larger cities in China's main industrial provinces, there is a need for Tianjin's fire and emergency services to establish equipment levels that meet the wider range of operational requirements resulting from this development.

Despite costing significantly more than nationally made helmets, the Cromwell F600 met the Tianjin Fire Bureau's requirement of higher protection levels for both the helmet and faceshield, and improved wearer comfort. Additionally, the capability to adjust the fit of the helmet for size, crown height, and brow pad when used with a facemask, easily accommodated the ethnic differences in head and facial shape.

Bob Gaskell, Helmet's Business Development Manager comments: "This first major order from Tianjin opens up the opportunities for us to increase our export sales to China. Wuxi Firetre Safetech Ltd, our Chinese distributors, who specialise in the supply of PPE to the fire services and petrochemical industry, have included several western manufacturers in their catalogue range, enabling them to offer an integrated package of the latest technology equipment, supported by a team of trained sales engineers."

For further information, please contact:
Helmet Integrated Systems Ltd.
Tel: +44 (0) 1462 478014
Email: bgaskell@helmets.co.uk

FOAM BOSS MARK V COMPUTERIZED FOAM PROPORTIONING SYSTEM

The Around-the Pump proportioning system is based upon flow measurements using magnetic flowmeters. A high performance microprocessor based controller uses these measurements to precisely control the amount of foam being inducted into the system. The system is compatible with all foams at any pressure at percentages from 0.5% to 8.0% with increments of 0.1%.

The magnetic flowmeters measure the solution flow after the pump discharge and the foam flow from the foam tank. The measuring principal is based on laminar flow and Faraday's law and as such there are no moving parts or obstructions in the flow path. The metering valve is driven by a servo amplifier that allows for very high-speed response to any changes in flow rates.

A "touch-screen" computer is used to display flows, totals, and set and actual percentages and utilizes three discreet inputs for the following user connections:

1) Run/Stop
2) Operational/ Training Foam Percentages
3) System Flush

Additional discrete inputs and outputs are available for interfacing with other vehicle control systems. The control computer can also be used to reconfigure the system. The configuration screens are password protected and control the system parameters, flow measurement ranges, measuring units and to manually open and close the metering valve. They also allow access to diagnostic information for maintenance and trouble-shooting.

For more information, please contact:
Nordic Systems Corporation
E-mail: info@nordicsystems.com
Website: www.nordicsystems.com

LINEAR HEAT DETECTOR WITH ATEX CERTIFICATE

Since 1 July 2003 all products in Europe to be used in areas subject to explosion hazards must be certified in conformity with European standard ATEX 100a. The manufacturer **Securiton** has now received the EC Conformity Declaration for its linear heat detector SecuriSens ADW 511 Ex-II ATEX. The device detects hazardous fire criteria rapidly and reliably based on the physical principle of pressure changes of gases at constant volume when temperature changes occur. The evaluating processor unit continuously checks the ambient temperature via copper sensor tubing. If the measured pressure increase exceeds the programmed value, an alarm is triggered.

This tried and proven alarming principle is virtually immune to electrical, thermal and mechanical disturbances. At regular intervals a precisely defined overpressure is created in the sensor tubing to detect faults. In the event of a detected leak or crushing, the detector signals a "Fault".

The heat detector can be used in Ex zones 2 (gas) and 22 (dust).

Fully electronic measuring cells and microprocessor-controlled evaluation allow response behaviour to be adjusted precisely to the specific requirements of the deployment location. The measured values can be graphically displayed and recorded using PC software. The evaluating processor unit can be installed directly in the Ex zone.

The SecuriSens ADW 511 Ex-II ATEX is currently the only heat detector that fulfils Class A1 requirements in compliance with EN 54-5 and can also be used with high ambient temperatures. It is also VdS certified.

For more information, please contact:
Securiton AG
E-mail: export@securiton.ch
Website: www.securiton.ch

TASK FORCE TIPS ULTRA HYDRANT

Industrial fire planning, training, and operations are often singularly focused on supplying maximum flows for exposure protection, cooling, or fire suppression. Though the costs of these pre-suppression activities and the equipment required to provide maximum fire flows may seem enormous, the dollar losses associated with damage from an actual incident, combined with the interruption and loss of production is of a far greater concern.

One tactic that is gaining widespread acceptance in this high flowing segment of the firefighting market is the construction and strategic installation of the **"ULTRA-HYDRANT"**. Designed to supply mobile apparatus with multiple 5″ or 6″ supply lines from a single monster hydrant header, these custom designed installations can take full advantage of a facility's firewater flow capabilities.

A key part of the functionality of the **"ULTRA-HYDRANT"** is the integration of flow control valves for each discharge port, allowing supply lines to be independently controlled. An integral part of the **"ULTRA-HYDRANT"** distribution design is the new Task Force Tips Jumbo Gate Valve. This new gate valve is the clear choice for just some of the following reasons:

- The Jumbo Gate Valve's large unobstructed waterway will provide flows well over 2000gpm with less than 10psi loss.
- The Jumbo Gate Valve's swiveling outlet elbow reduces the possibility of flow restricting kinks.
- TFT's unique three-part corrosion protection process, and stainless valve components provide longer life in harsh industrial environments.

For additional information on TFT's full line of Jumbo Gate Valves, and Jumbo Wye and Siamese appliances, contact customer service at 800-348-2686 and request the new LDH hardware video. For more information on how to maximize your industrial fire flows, visit www.tft.com

For further information, please contact:
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For nearly two decades Unifire has been leading the industry in manufacturing the highest quality blowers available. Unifire meets the ever-changing industry by producing the most technologically advanced products and standing behind each product 100%. By holding several patents in PPV, Unifire continues to develop new solutions to meet your every need. All Unifire PPV fans are stand alone operational and most are compartment sized and lightweight for easy handling.

Unifire offers a wide range of blowers that use gas, electricity or diesel to power the high performance motors. Also, Unifire blowers come in a range of styles to suite your every need and price range. Each gas or diesel blower comes on Unifire's stainless steel wrap around frame that can be tilted from –10° to +20°, allowing for ventilation of any area from a basement to a window or doorway. The stainless steel frame comes with or without a 35″ extendable handle and solid rubber 8″ wheels that act just like pneumatic wheels.

A third available frame style is the Du-All 180° frame. This frame is only available with the electric PPV fans and features the 35″ extendable handle, wheels and is able to be rotated up to 180° inside its frame, allowing airflow to be directed straight up or straight down, and anywhere in between.

All Unifire PPV blowers come standard with open shrouds. The open shroud design allows air to be sucked in from the sides, top, and bottom as well as the back of the shroud. The open shroud design also allows the fan to be placed 3-8 feet away from a doorway or opening. Allowing the fan to be placed on a small patio or landing while other fans would have to be placed 8-12 feet away.

With Unifire PPV blowers the Unitron blade pitch determines the cone dimensions. This also helps with getting the fan closer to where it is needed. The Unitron blade is a standard feature on all Unifire PPV fans and is 100% shatterproof. These blades are made of a synthetic nylon and reinforced with carbon fibers. This material allows the blade to be impact and stress resistant with the best thermal expansion & contraction available. All Unifire blades are direct drive, allowing for 10% more HP transferred to the blade.

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98% of all PPV's produced by Unifire since 1987 are still in use today.

For more information, please contact:
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Lancashire Fire and Rescue Service International Training and Development Centre at Washington Hall was established in 1964 and is proud of its history in providing training to emergency services world-wide, in particular:

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- Trauma and Rescue
- International and Industrial Firefighter
- Fire Safety
- Management Development
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Over the past 20 years Lancashire Fire and Rescue Service have influenced many positive changes in the Emergency Services and in particular Fire Services in a number of countries in Asia Pacific; this includes:

- Japan
- Malaysia
- Hong Kong
- Australia
- New Zealand

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- Fire Service restructure
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Issue 11 – September 2004
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REPORTING TO THE ASIA PACIFIC FIRE PROTECTION AND FIRE SERVICE INDUSTRY

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Issue 12 – December 2004

APF

ASIA PACIFIC FIRE MAGAZINE

REPORTING TO THE ASIA PACIFIC FIRE PROTECTION AND FIRE SERVICE INDUSTRY

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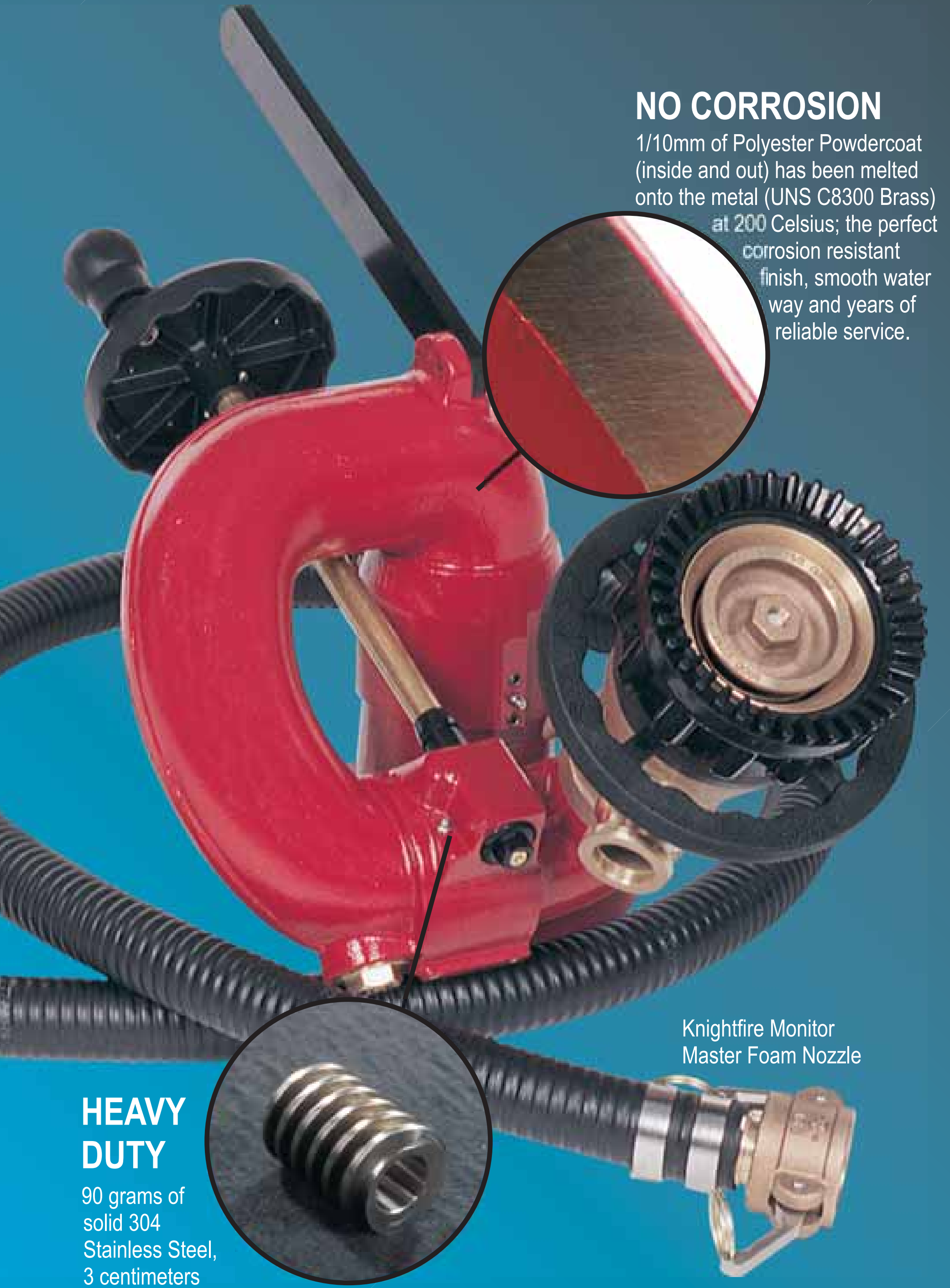

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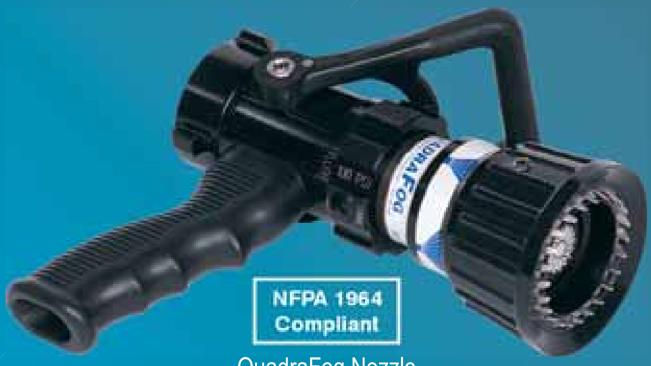

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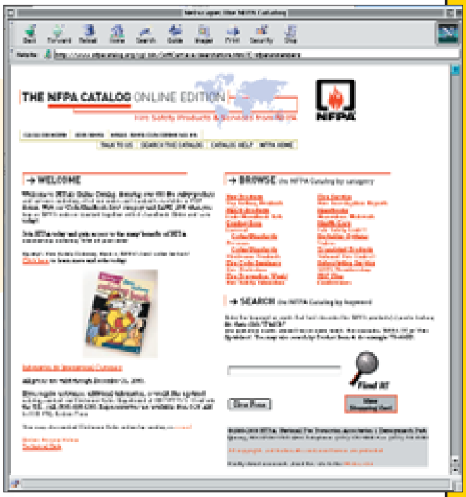

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FOREWORD

by Jeff Godfredson

NFPA's Asia-Pacific Operations Director

ON A POSITIVE NOTE

Unfortunately a glance at the headlines shows us that the world is nowhere near coming to grips with the fire problem that continues to cause needless and preventable loss of life, debilitating injuries and loss of product and resources with its resultant impact on a number of other social and economic indicators.

As the heading shows I wanted to make some positive comments about the future of fire protection and life safety. As NFPA's representative for the Asia Pacific region I get to visit many countries and attend many conferences. Recently I participated in a Fire Show in China, Conference in South Korea and the Biannual Conference of the International Fire Chiefs Association of Asia in Taiwan. On reflection I picked up on a common theme.

There was present at all of these events a willingness and desire to share information and experiences. It is not to say that this has not happened in the past, but it seems people are doing a better job of communicating; much more than just exchanging information. It may because of the more universal use of English or perhaps the internet. Regardless of the reason, I found it very encouraging.

For those who have had terrible experiences with fire to share with others may help others from sharing a common fate. For those who have developed sound fire protection experiences and good fire engineering and science to also willingly share this information will help those in the developing world to lay a good fire protection foundation for future generations. I welcome this development and encourage it.

Something that I took away from one of the events was a comment of one of the speakers "there are only two types of buildings in the world; sprinklered and unsprinklered." Think about it.

I would like to take this opportunity to wish all a fire safe holiday season.

Jeff Godfredson
NFPA's Asia-Pacific Operations Director

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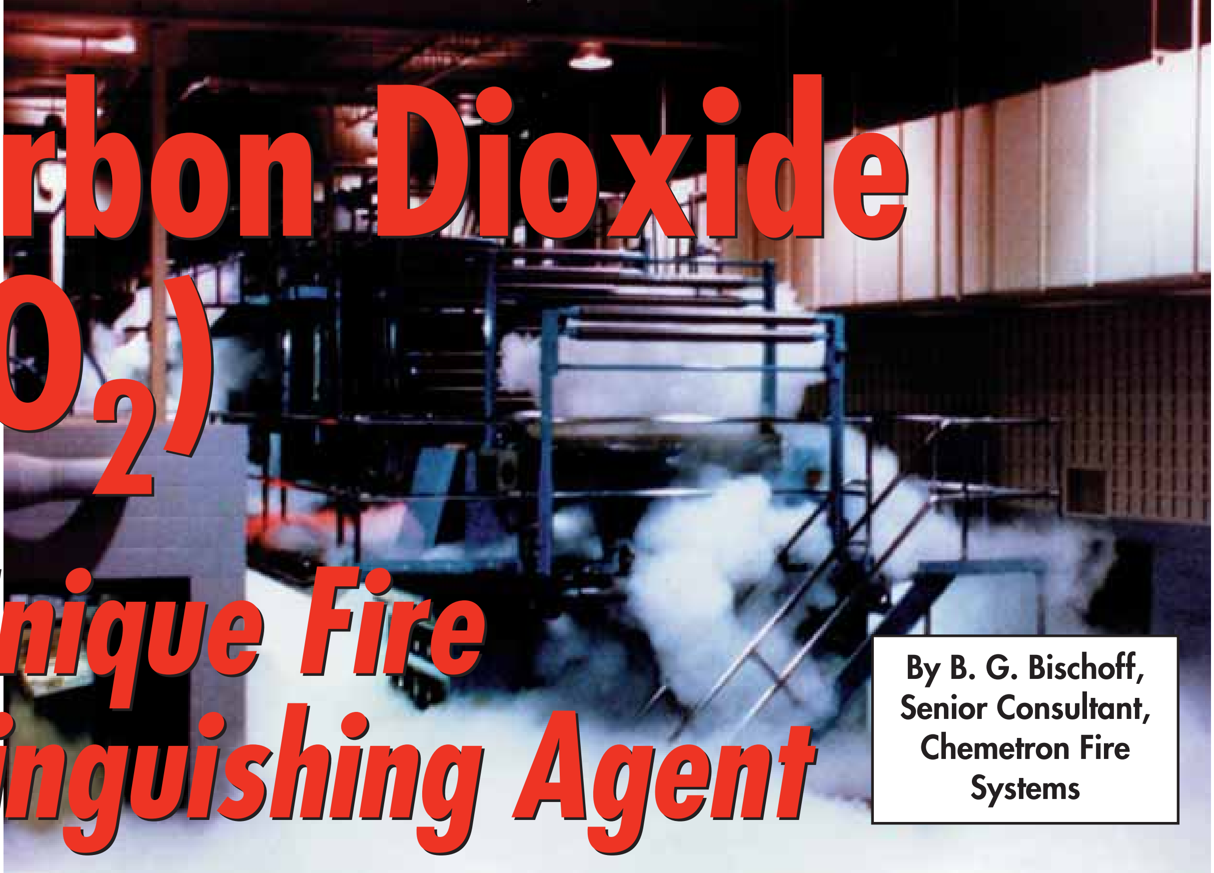
Carbon Dioxide (CO_2)

A Unique Fire Extinguishing Agent

By B. G. Bischoff,
Senior Consultant,
Chemetron Fire
Systems



Picture courtesy of Chemetron Fire Systems

CARBON DIOXIDE (CO_2) HAS BEEN used as a fire-extinguishing agent in fixed fire protection systems for over 90 years.

It is a naturally occurring gas, which is extracted from a number of normal CO_2 producing processes and stored until needed, (thus there is a net removal of CO_2 from the environment, when used in fire suppression systems). The costs involved in capturing, storing, and distributing CO_2 are also minimized as they are spread over a wide range of other common uses, the most recognizable being beverage carbonation.

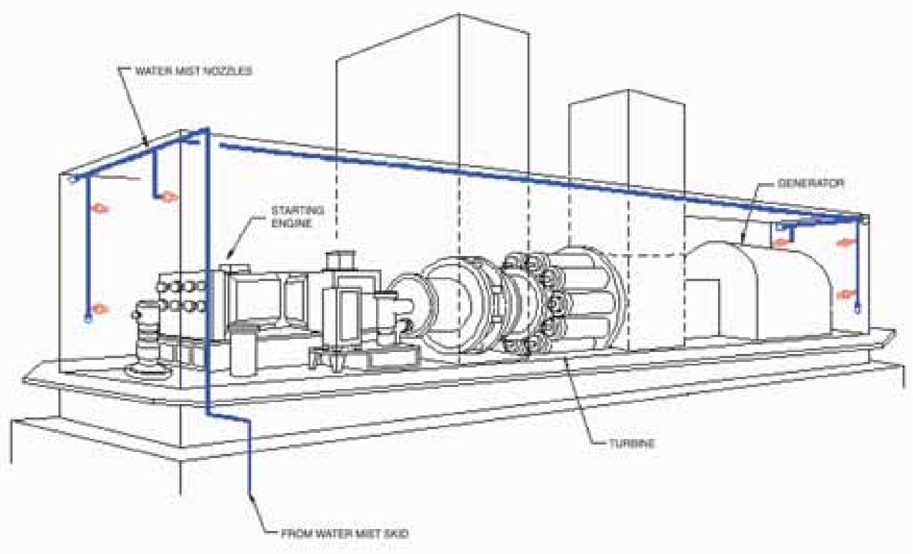
As a gas it has a three-dimensional fire-fighting characteristic. In addition, it is inert, dry and leaves no residue after system discharge. It can be compressed into a liquid state which, when maintained under pressure, allows a more efficient storage than other inert gases such as nitrogen and argon.

From a fire suppression stand point the most important characteristic of CO_2 is that when it is discharged, and the pressure drops, a significant portion of the CO_2 'flashes' into fine particles of solid CO_2 ('dry ice'.) As the dry ice particles sublime (change from solid to gas), the inerting characteristic of the CO_2 discharge and a limited amount of localized cooling provides for fire extinguishment. The dry ice particles can be projected over much greater distances than would be possible with a vapor (gas only). The almost instantaneous phase changes from stored liquid, to solid dry ice discharging from the system piping, to the CO_2 vapor (in very effective fire extinguishment capabilities) make carbon dioxide equal to none when being compared to other gaseous extinguishing agents.

It is also possible to create CO_2 discharge patterns, which, even without benefit of enclosing walls, can envelop the protected equipment in case of fire and offer quick, clean suppression, minimizing any interruption to vital operations or processes.

While, the flooding (inerting) characteristic of CO_2 ("total flooding") defines its use in enclosed spaces, the enveloping localized discharge ("local application") defines its use for unenclosed equipment protection. The versatility of applications is what gives CO_2 its true uniqueness.

There is a negative side to CO_2 use when compared to the other "clean" fire suppression agents available on the market today. The discharge of carbon dioxide in fire extinguishing concentrations creates serious hazards to



Picture courtesy of Chemetron Fire Systems

Carbon Dioxide (CO_2)

A Unique Fire Extinguishing Agent

personnel, including the possibility of death by suffocation during and after the discharge. Thus CO_2 should never be considered for use as a total flooding type system in any areas that are normally occupied by personnel. Suitable safeguards should be provided to ensure prompt evacuations prior to use of CO_2 and prevention of entry into areas that CO_2 has been discharged or has migrated. In addition, appropriate system hardware (system lockouts) should be provided to prevent accidental or deliberate discharges during system maintenance or when persons not familiar with the systems and their operation are present in the protected space. The National Fire Protection Association, has been publishing a standard on carbon dioxide extinguishing systems (NFPA 12) for over seventy years with well-defined safety requirements. The majority, if not all, accidents associated with CO_2 occurred because the individuals, charged with the use, installation and/or maintenance of carbon dioxide systems, were not properly trained to work on and in the vicinity of the systems.

To provide a better understanding of how CO_2 can be used in some actual, yet unique, applications, the following examples are offered:

COLOR PRINTING PRESSES

In the production of packaging material, bold, attractive colors have been found to attract buyers. The packaging material is produced on Rotogravure or Flexographic Presses that do high quality printing on continuous sheets of paper, film or foil. These presses are often coupled with Laminators which 'sandwich' the printed-paper, film or foil together to give the packaging its appeal and strength. In the printing or laminating process it is often necessary to use solvent based inks and/or adhesives to give the desired results. Many of the inks and adhesives used are flammable and create a significant fire hazard that must be protected against.

Solvent-based ink is either pumped from a central ink storage location or a smaller ink supply can be located at the printer. From the location of the supply the ink is piped to a shallow pan (or font) with a roller, which picks up the ink from the pan and applies it to an impression roller. The roller applies the ink or adhesive to the surface of the material being printed/coated. The primary fire hazard is the ink/solvent with its accompanying vapors.

After the sheet material is printed or coated it is dried by threading it through an oven(s) where additional vapors from the ink are released. These dryers are part of the total fire hazard. At the same time, in the printing process, vapors are released at the printer fonts, which are drawn up into exhaust ducts for removal from the processing area.

It is extremely important that the total hazard be protected. Good fire protection practice dictates that anything that can lead a fire into a hazard area or that can extend it out from the primary fire area should be protected as a part of the "hazard". Obviously, this should also include potential spills. At the printer/laminator ink supply the potential for a spill on the floor, as well as the exposure of the ink reservoirs at each press, expands the size of the hazard.

The flexibility of CO_2 system design and having the capability to be versatile in the application of CO_2 allows for good, efficient fire protection.

Since the fonts with rollers and pans are not enclosed we must use "local application". Fortunately, local application CO_2 systems have a wide variety of nozzles which can be located so that each can discharge to cover its assigned part of the hazard such that it will not splash or spread burning material and yet the nozzles and system piping can still be located so as not to interfere with the material handling equipment at the press and the need for equipment removal for cleaning and maintenance. The ink supplies and the spill areas will also need "local application" protection.

In addition to locally applying CO_2 in the inking area we need to "total flood" the vapor exhaust ducts and the dryer with CO_2.

Each segment of the total hazard can be protected properly while still

Picture courtesy of Chemetron Fire Systems

“Carbon Dioxide has safely extinguished more fire than any other gaseous extinguishing agent”

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Based on a design philosophy using a centrally located 11 Tonne capacity LP-CO_2 storage system, 12 separate risks are protected at a Toppoly Electronics facility in Taiwan. A major engineering achievement was ensuring a trouble-free discharge in protecting a 5000m^3 electrical switch-room located well away from the central storage area.

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拍火龙低压力二氧化碳灭火系统，通过其产品的可靠性及超卓生产工艺，已发展成为现时最高安全标准的系统。拍火龙系统能够在原来安装位置进行就地充气，并附有专利设计的自我检测系统，比较其它普通钢瓶系统占用更少面积，使消防专业人员在设计上更具灵活性。而且，拍火龙更能配上一套极高可靠性能的紧急手动关闭系统装置。

综合以上各项及其它特性，就能达致大幅降低总投资及维护成本的方案。

가정이나 직장에서 고압 전기가 사용되고 지상 12km 상공에서 항공기가 비행하는 것이 당연하듯, 산업플랜트와 민간건물 및 해상의 화재위험구역을 방호하기 위해 CO_2 소화설비를 엄격한 안전기준에 따라 설계하는 것 또한 당연합니다

Pyrozone모듈형 저압식 CO_2 소화설비 시스템은 현장에서 입증된 신뢰성 높은 기술을 바탕으로 최고의 안전기준에 따라 화재를 소화할 수 있게끔 개발되었습니다. 탱크로리차로 현장에서 바로 충전할 수 있고, 저장가스량을 자동 측정하는 전자장치로 충전량을 언제나 확인할 수 있으며, 많은 양을 저장할 수 있고 미려한 탱크형으로 저장면적이 대폭 줄어들고, 예비가스량도 충전하는 등 설계를 다양하게 할 수 있습니다. 이제 CO_2 소화설비가 필요하는 곳이면 어디든 경험과 기술을 겸비한 SHE한테 연락해 주십시오.

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Picture courtesy of Chemetron Fire Systems

applying CO_2 in a different manner, however; only one CO_2 system needs to be provided to protect the "total" hazard.

DUCTS AND VAPOR/DUST COLLECTION SYSTEMS

With renewed interest in air quality and regulatory efforts to ensure the same, it is most important to ensure that hazardous vapors and dust be collected and not allowed to enter the environment. When these materials are flammable or combustible, there is an ever-present potential for fire. In many installations there is also a build-up of combustibles on the inside of the ducts conveying vapors or dust further increasing the hazard and increasing the need for fire suppression requirements.

If a fire should occur, locating and controlling the fire before it can cause serious damage is imperative, but not easy. In addition to potential property damage, the loss of the use of the vital collection system will shutdown the process with a potentially serious impact on plant operations. The use of CO_2 to protect these units has worked out extremely well.

As a gas, CO_2 can be injected into the ductwork and collector(s) in such a way that the entire system is inerted and fires suppressed. NFPA 12 "Standard on Carbon dioxide extinguishing Systems" has contained design criteria for duct and collector protection for years. The specified requirements have resulted in systems fairly easy to design when CO_2 is used. Discharge nozzles and piping networks can be easily calculated ensuring that a system, no matter how complex, will deliver the required gas where needed and in the required quantities to ensure fire suppression throughout the collection system. As an added bonus, it will leave the ducts and collector(s) dry, facilitating a quick return to service. Coupled with current detection technology, fast operation in case of fire is assured.

COMBUSTION TURBINE AND ENGINE ENCLOSURES

When considering CO_2 protection of combustion (gas) turbines and engines within an enclosure, the first determination is what combustible is to be used as the basis for the CO_2 design concentration. Fuel oil and Lube oil requires 34% design concentration of CO_2 while natural gas requires a 37% design concentration. Since it is imperative that CO_2 be maintained at design concentration or higher in hazard space long enough to extinguish a fire, there should be an analysis to determine how long it will take for a turbine to wind down to a stop, after the unit has been shutdown. There is also a concern as to the temperature of the exposed metal surfaces and how long the surfaces will take to cool down after unit shutdown. This information is generally available from the manufacturer, or field measurement will be required. The turbine information, along with the volume and configuration of the compartments to be protected, can be used to calculate the initial discharge quantity of CO_2 required for protection. In addition, data must be collected (usually by testing) to determine the CO_2 loss rates from the protected compartments during the wind down period of the unit. (As a turbine winds down to a stop, fresh air is being drawn or forced into the compartments and forcing the initial concentration of CO_2 out.) This information is used to determine the extended CO_2 discharge rate needed to maintain the CO_2 design concentration during the run down/cool down time period.

The result is that the fire suppression system design is based on the parameters as defined for the operation of the turbine. NFPA Standard #12 requires a full CO_2 system discharge test be performed on every installed system. This will positively indicate if the extended discharge provided will be capable to meet the requirements of the fire suppression design necessary to protect the turbine for the entire time period.

Over the years, halocarbon systems have been used for initial flooding but very rarely with an extended discharge. Fire experience has demonstrated the need for full-extended discharge protection as stated in NFPA Standard #37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines) Para. 11.4.4 (i.e. design based on specific combustibles present and specific configuration of enclosure plus holding the design concentration for a minimum of 20 minutes or until the engine surfaces have cooled).

Design of extended discharge systems are normal when using CO_2 but are usually avoided when using halocarbons due to significant cost increases. The overall history of success with CO_2 vs. numerous failures with other gaseous agents, has firmly established CO_2 as the preferred agent for gaseous agent protection of Gas Turbines.

SUMMARY

In summary, regardless of the growing numbers of extinguishing agents used for fire suppression, carbon dioxide systems continue to be one of the best, most effective and most versatile suppression systems available on the market today. Above we have provided a brief overview of three unique, yet common CO_2 fire suppression system applications used throughout the world. A more accurate statement would be "a brief overview of only three applications of a collection of way too many to list in any one document.

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Fluorinated Foams and the Environment

**By Thierry Bluteau,
Ph. Organic Chemistry,
BIO-EX Managing Director**

Picture courtesy of BIO-EX S.A.

IN THE MID-SIXTIES, 3M started producing fluorosurfactants allowing high extinguishing performance to be achieved with hydrocarbon fires: this was the start of AFFF (aqueous film-forming foam). First used in synthetic foams, these fluoro-compounds would later be used in a range of foam types: fluoroprotein (FP), film forming protein (FFFP), and Alcohol-Resistant foams (FFFP-AR and AFFF-AR).

Q: Why do we use fluoro-compounds in fire fighting foams?

A: Fluoro-compounds increase the resistance of the foam to fuel contamination and enhance the speed of extinction. Relevant standards require expected levels of performance with fluorinated foams.

From a practical point of view, fluorinated foams permitted lower application rates for extinguishing mainly large hydrocarbon fires.

Q: Why this debate now?

A: In May 2000, 3M suddenly phased out its fluorine chemistry revealing that fluorinated foams, up to then considered harmless, could be a threat to the environment and mankind.

Q: How can we evaluate the impact of fluorinated foams?

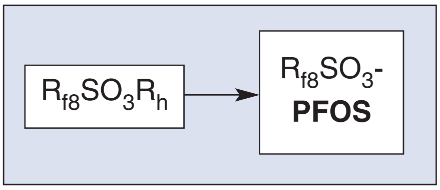
A: Environmental impact can be determined based on whether a product is Persistent, Bioaccumulative or Toxic: its so-called PBT profile. It is necessary to estimate the PBT profile for all the compounds, which may be released into the environment after foam use.

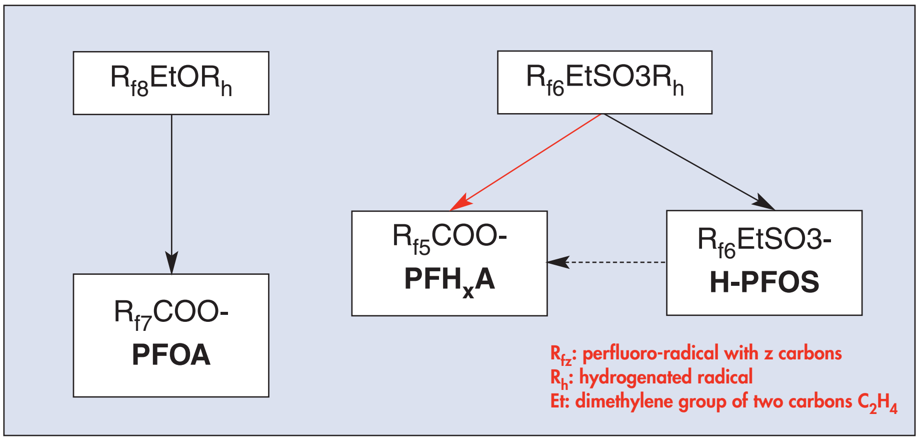
After being released into groundwater and soil, fluorosurfactants are quickly degraded by microorganisms, except for the fluorine-containing tail. Many of these end products have yet to be evaluated.

Picture courtesy of BIO-EX S.A.

Q: Which fluoro-compounds are used in fire fighting foams?

A: Two manufacturing process are used to make fluorosurfactants. 3M's ECF (electrochemical fluorination) process is now obsolete; the starting surfactant is biodegraded into a sulfonate.




$R_{f8}EtOR_h$
$R_{f6}EtSO3R_h$
$R_{f7}COO$-
PFOA
$R_{f5}COO$-
PFH_xA
$R_{f6}EtSO3$-
H-PFOS
R_{fz}: perfluoro-radical with z carbons
R_h: hydrogenated radical
Et: dimethylene group of two carbons C_2H_4

The telomer process is now used for all the fluorosurfactants found in fire fighting foams. Depending on the functionality contained in the fluorotelomer surfactant, these can be biodegraded in different ways.

The end products of concern because of their environmental impact are:

- PerFluoroOctanylSulfonate: PFOS
- PerFluoroOctanoic Acid: PFOA
- 1H, 1H', 2H, 2H'-PerFluoroOctanyl-Sulfonate: H-PFOS or 6:2FtS

These three products have 8 carbon atoms in the backbone, terminating with either a sulfonate group (SO_3) or a carboxylate group (COO).

In addition to these three products with 8 carbons, homologues (R_{fz}: z = 6 to 12) are often present in various proportions depending on the supplier.

Q: Are fluorosurfactants biodegradable?

A: Measures of biodegradation (BOD/COD) give partial information for components – such as surfactant, protein, and glycol – with a short-term environmental impact. The standard methods are not suitable for getting information on the perfluoro-radicals!

Q: What is their impact?

A: Perfluoro-compounds are extremely stable compounds with no possible degradation pathways in the aquatic environment. There is no doubt that they can persist for a very long time in the environment.

PFOS and PFOA have been extensively studied. PFOS is Persistent, Bioaccumulative and Toxic. It is being phased out for fire fighting applications.

PFOA exhibits a similar profile PBT to PFOS, but at reduced level; nonetheless, the telomer industry has reacted by offering fluorosurfactants based on 6-carbon perfluorocarbons (instead of 8), which avoid the possibility of degradation to PFOA. The end product is

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H-PFOS (6:2 FtS), as recently shown in a scientific study and confirmed by a Dupont de Nemours's company spokesman.

This recent development within the industry confirms the reality of the suspicion over perfluoro-compounds – PFOS, PFOA – previously used in fire fighting foams.

Q: Are these "new" fluorosurfactants "safe"?

A: Scientific studies published in 2004 confirm that 6:2FtS (fluorotelomer sulphonate) is present in groundwater at very high concentrations – up to 14.6 mg/litre – a decade or more after the site was last used, by far exceeding previously recorded values for PFOS and PFOA.

PFOS and the fluorotelomer sulphonate 6:2FtS have the same carbon backbone – 8 carbons – and a very similar structure which makes one think that their toxic and bioaccumulative behaviour would also be very similar, *unless experimental studies prove the contrary.* Actually, **no study has proved if this product is toxic or not.** It is thus dangerous and probably premature for foam manufacturers to claim that their fluorotelomer foams are safe.

Picture courtesy of BIO-EX S.A.

Q: Can we produce foam without fluoro-compounds?

A: Yes, new EN certified fluorine-free foams are available in the market place.

Q: Can we use them to replace fluorinated foams?

A: It is possible in most cases; they offer a true alternative for municipal fire brigades, because they do not cause environmental problems and have a similar efficiency when applied at normal operational application rates and with equipment already in use by these fire brigades. They are efficient too on polar solvents fires and offer an answer for some chemical risks. Their weak spot is for big petrochemical industry hydrocarbon fires, at reduced application rates and for violent or turbulent application.

Q: What about Class A additives?

A: Class A additives do not contain fluoro-compounds and must comply with environmental regulations. The best performing products are efficient in more than 95% of all cases for fire brigade incidents, and can be used at Low, Medium and High expansion with end-concentrations below 1%. Specially conceived and developed to cope with Class A fires, they exceed by 5 to 10 times the performance ratings of fluorinated foams on Class A fires.

These additives are of the most significant interest to municipal fire brigades and are used on a daily basis in an ever-increasing number of fire brigades throughout Europe.

Q: What should we conclude?

A: We cannot say that fluorinated foams are "safe" while environmental and toxicological studies are still on going, and which seem to indicate the contrary in many cases. Fluorine-free foams and additives are highly recommended where they are known to be efficient for the risks being considered, that is to say for more than 95% of the fires tackled daily by municipal and rural fire brigades.

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Don't Use Class B Foams in Place of Class A Additives!

MANY PRODUCTS, SO CALLED ADDITIVES, are available on the market to fight class A fires; efficient, economic, **without persistent residues**, they attract users and can be used in a wide range of applications. Nonetheless, some manufacturers offer Class B foams in applications other than class B fires, without any evidence of their performance. We will examine hereafter why B foams should not be used on class A fires.

By Thierry Bluteau,
Ph. Organic Chemistry,
BIO-EX Managing Director

HISTORY

Since the early 80s, fire brigades have been using additives to fight forest fires. These products are of two types:

- **Retarding agents:** they are a blend of phosphates and clay, dyed red. They are used at high concentration levels – 10 to 20% – mainly for planes.
- **Wetting agents:** they are a combination of surfactants. They are used at low concentration levels-0.1 to 1% – essentially for terrestrial application.

	Retarding agent	Wetting agent
Nature	Phosphate + clay	Surfactant
Concentration of use	<10-20%>	<0.1-1%>
Application	Aerial	Terrestrial

FIRE BRIGADES NEEDS: A NEW TENDENCY

Firemen realize more than 95% of their fire operations on class A fires: forest, bush, buildings, houses, vehicles, and warehouses. To tackle these fires, some manufacturers improved their additives to cope with all these risks.

The ultimate generation of additives are very attractive because the most efficient of them offer several advantages:

- They are totally liquid – non viscous – and so easy to induct
- They are 100% biodegradable and do not contain perfluoro compounds
- They are very economic as their concentration of use is far below 1%
- They are wetting and foaming, and can be used in Low, Medium and High expansion
- They are efficient on small hydrocarbon fires
- They can be used with all conventional equipment

THE WETTING POWER

The wetting effect enables water to penetrate solids and make them impossible to burn.

Water only stays at the surface without penetrating solids. It acts only as a cooler and extinguishes the surface. Lowering the surface tension from 72 mN/m (water) to less than 30 mN/m is necessary to achieve a wetting effect. All studies made on the interest of class A additives indicate an extinguishing efficiency multiplied by five if compared with water only.

FOAMS AND WETTING POWER

Some manufacturers present their foam as an alternative to class A additives, justified by a surface tension value similar to additives.

To set an example, for laundry products, the wetting power strongly depends on the surfactant chemical structure, and does not refer to its ability to lower the surface tension.

It might be interesting to know if there is any correlation between tension and efficiency on class A fires.

Concentration	Additive A	Additive B	Additive C	Foam D	Foam E
0.1%	1.7	1.1	1.0	0.1	0.8
0.2%	2.3	1.9	1.4	0.3	1.1
0.3%	2.7	2.4	1.9	0.5	1.3
0.6%	3.6	3.0	2.9	0.7	1.5
1%	5.4	3.8	3.9	1.0	1.7
3%	–	–	–	2.2	3.3
6%	–	–	–	3.6	5.2

Explanation:
WP < 1 : No wetting effect
1 < WP < 2 : Poor wetting effect, limited efficiency
WP > 2 : Strong wetting effect, high efficiency

COMPARISON STUDY

Such a study was done at BIO-EX laboratory.

In essence, the study measured a surface area covered by a droplet of wetting solution on solid surface. The results – WP: Wetting Power – showed the spreading coefficient compared with water. The results are summarized in the table below.

REMARKS

Depending on the additives – A, B, C – the wetting power starts between 0.15% and 0.3%. Then it regularly increases until a limit.

Depending on foams – D, E – the wetting power is situated between 1.5% and 3%.

Foam D does not have a wetting effect till 3%. Foam E, although being better than foam D, does not have a wetting effect below 1.5%.

We remark that it is necessary to use around 10 times more foam than additive – in concentration of use – to achieve the same performance on class A fires.

There is no correlation between the surface tension and the wetting power: foam D at 1% has a tension of 22, additive C at 0.1% has a tension of 29, but their wetting power is the same: 1.0!

It is easy to visualize the wetting effect on a paper sheet: a drop of additive will flatten itself and then spread, a drop of foam will stay round. . .

THEORY EXPLANATION

The surface tension is lowered for foams at low concentration levels – below 1% – due to fluorosurfactants. Fluorosurfactants by nature do not have any affinity for organic compound (wood, paper, plastic. . .) they have a ''repelling'' effect on solids, which prevents water to penetrate.

CONCLUSION

Additives are today acknowledged for their extinguishing power, and offer a big plus for firemen safety. The best ones can be used in nearly all daily fire brigades' operations.

Foams cannot replace additives; they are not efficient at low concentration of use – below 1% – and do not offer a practical or economic alternative to address class A fires.

On top of that, foam use increases the dispersion of persistent fluoro compounds in the environment.

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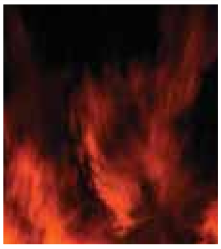

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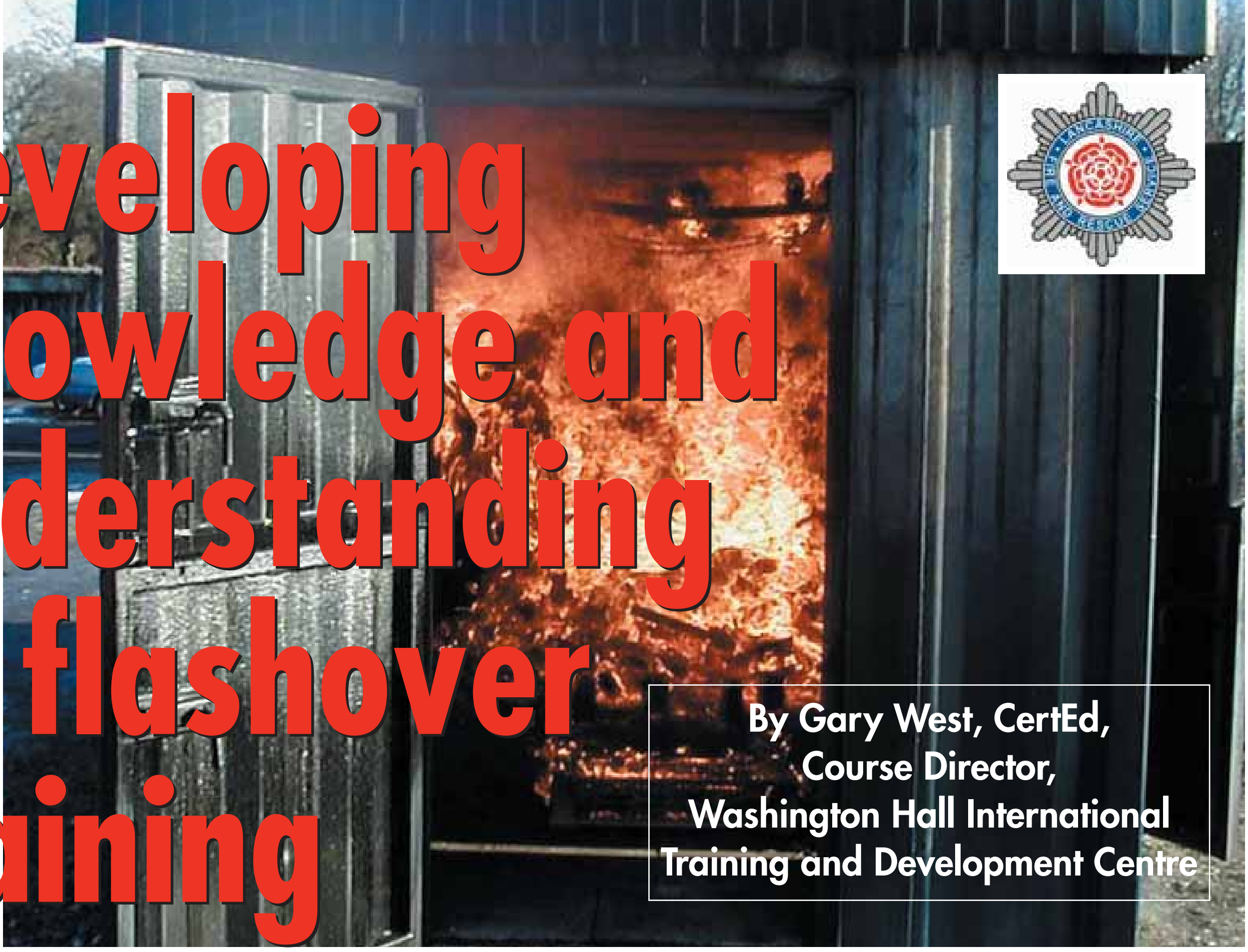
Developing knowledge and understanding of flashover training

By Gary West, CertEd,
Course Director,
Washington Hall International
Training and Development Centre



Picture courtesy of Washington Hall International Training and Development Centre

FOR AROUND FORTY YEARS the term 'flashover' has been used widely within the English language with regard to a specific situation often encountered by fire fighters attending incidents. In recent years however, a more thorough understanding of what a flashover actually is and the safety measures and methods of dealing with such a phenomenon has been initiated.

The following article is not intended to delve into the science of fire or of other studies that have been conducted in much depth. The objective of the following is to introduce the reader to the methods of training that are currently being undertaken within Lancashire Fire and Rescue Service. This training is also carried out for fire fighters in some bordering brigades who have a desire to educate their own staff under the umbrella that is referred to as 'Compartment Fire Behaviour Training' (CFBT).

BACKGROUND

The current situation regarding CFBT in the UK is that a National Standard for training of this nature is very close to completion and awaiting accreditation under BTEC/Edexcel. This accreditation is significant in the UK as it is a nationally recognised and highly respected award. It ensures the criteria contained within the pre-determined standards are achieved; that the lessons taught within one particular Fire Service are exactly the same in all the others in the country. Consequently, a national standard is reached, covering elements such as PPE (Personal Protective Equipment), rehydration awareness, trainer health, temperature monitoring, and water application techniques.

The 'body' that has a responsibility for developing and writing the standards for this prior to consultation and application for the award, consists of fire officers from most of the different fire services throughout the country. There are no set criteria that determine who is qualified to sit within the group,

Picture courtesy of Washington Hall International Training and Development Centre

Developing knowledge and understanding of flashover training

but as you would perhaps expect, the majority have an in-depth knowledge of Compartment Fire Behaviour. This knowledge and understanding has in many cases been gained abroad, specifically Upsala in Sweden, where the expertise is widely recognised as being at the forefront in delivering CFBT.

THE AUDIENCE

Below is a section on Positive Pressure Ventilation (PPV). Without going into too much depth (as this subject was extensively covered in the September issue) the link between PPV and CFB training is something that is essential for all to understand. The training that has been delivered in recent years has been designed in such a way that personnel are educated about the way in which fire behaves, critically, *before* they are taught how to 'blow' it out of compartments, or more technically speaking, pressurising compartments.

As such, courses developed within Lancashire have been designed to educate all ranks within the County and are conducted over a variety of periods. Training is delivered initially to recruits on their basic breathing apparatus course. This gives them a full day of theoretical and practical training, in order to introduce them to the basic principles of fire, how it develops, how to recognise the signs and indicators of flashovers and backdraughts, what actions to take should they recognise such, and water application techniques.

Courses are also designed that deliver half day refresher training on CFB to operational personnel within the service. One day Incident Management Courses have elements of CFB and how to manage an incident where issues such as flashover or backdraught may be significant.

Lancashire Fire & Rescue Service currently have officers who are prominent in developing one week of a 2 week CFB Trainers Course. This course will allow a number of personnel throughout the country to qualify to undertake the role of trainer in this specialised area. They will implement the standards proposed for submission to the governing bodies (referred to earlier).

The reference to one week of this 2-week course is significant. Lancashire Fire & Rescue Service are authorised to train personnel in 'real life' fire situations i.e. carbonaceous fires, whereas the facility to adopt the principle of liquefied petroleum gas (LPG) compartment fire behaviour training is not yet fully developed within this establishment. The question may be asked as to why we need this when carbonaceous fire training is available. This is due to environmental issues and the fact that other UK training centres are located within urban areas where houses and workplaces are close by. Carbonaceous burning for training is prohibited in these areas. Therefore, as written in the proposed standards, a CFB trainer must have the capability of training in the use of LPG systems.

THEORETICAL AND PRACTICAL TRAINING

As an example of the format of CFBT, the following is based on the initial input that basic recruits would receive as part of their breathing apparatus course. The theoretical input would consist of utilisation of both props and presentations.

At Lancashire Fire & Rescue Service, provision has been made to demonstrate a series of chemical experiments to students. These are numerous and educate the audience with practical understanding of the limits of flammability (lean/rich and ideal mixtures), Flash Point and Fire Point, and the ignition of flammable gases produced throughout the process of combustion.

During the theory element, a further prop is used to demonstrate on a larger scale, a simulation of backdraughts, and

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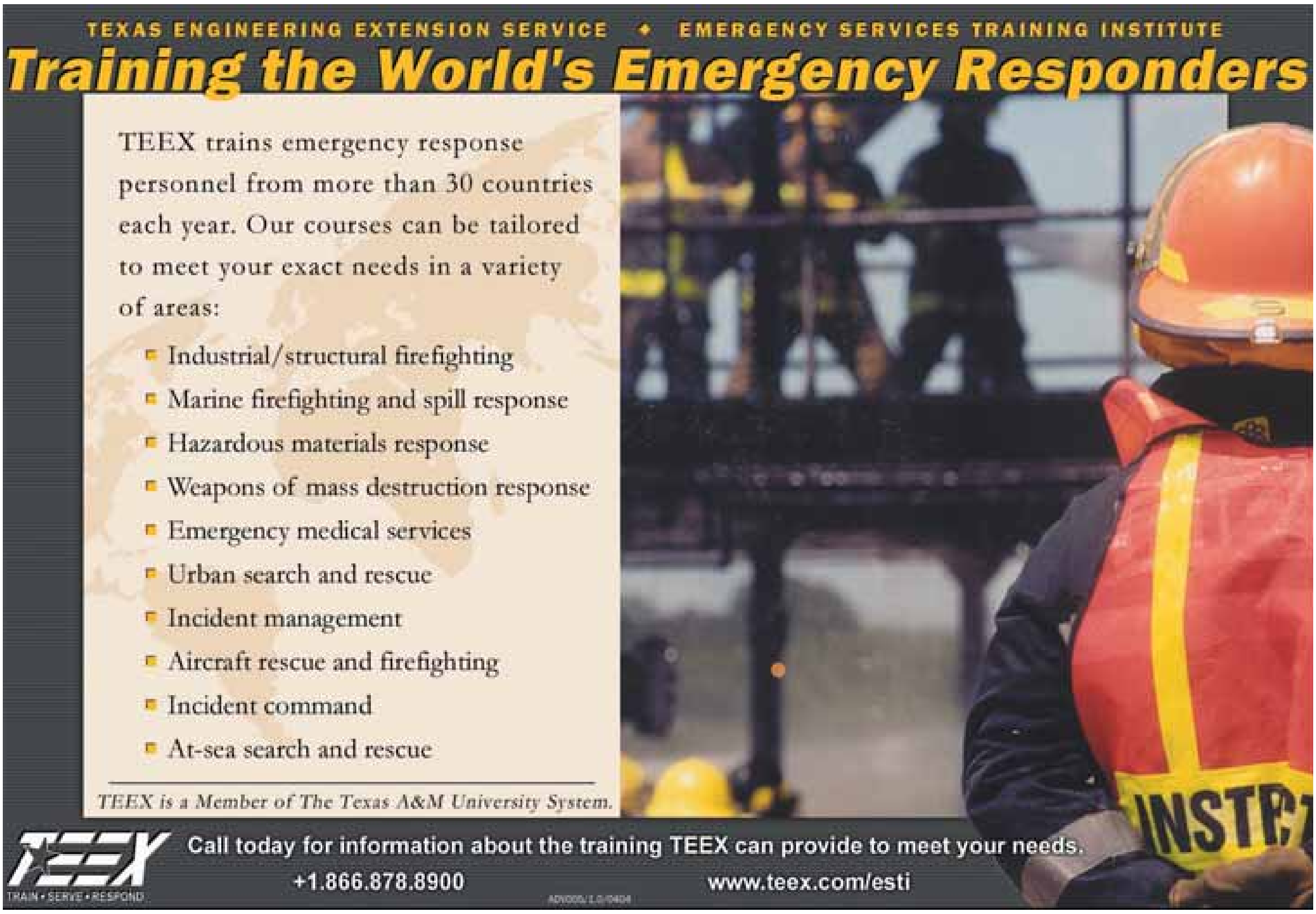

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again, limits of flammability. This is done using a structure designed and developed in Sweden. The fuel used is LPG. It must be emphasised that the equipment is designed to be used indoors, assuming all the necessary safety measures and risk assessments are adhered to. It can be adapted appropriately to simulate different scenarios. Lancashire utilise the flexibility of the equipment in order to re-enact real life incidents where perhaps a back-draught, flashover or even fire gas explosion has occurred.

Within the presentation delivery, the following subjects are discussed in order to meet the pre-determined aims and objectives of the course and achieve the desired outcomes.

Knowledge and understanding of:

a) The flammable range
b) Lower explosive limit and upper explosive limit (LEL and UEL)
c) Ideal mixture
d) The combustion process
e) Smouldering combustion
f) Pyrolisation
g) The neutral plane
h) Under pressure and over pressure
i) Fire development
j) Ventilation tactics
k) Signs and indicators of a flashover
l) Signs and indicators of a backdraught
m) Fire fighting tactics in a flashover situation
n) Fire fighting tactics in a backdraught situation
o) Auto ignition temperature
p) Mini backdraught situations
q) Flammable gas explosion (sometimes referred to as fire gas explosion)
r) Cold smoke explosion
s) Expansion ratio of water to steam, and how to avoid steam generation
t) Gas cooling skills
u) Indirect and direct cooling
v) Spray settings and pulsation skills
w) Door entry techniques in backdraught and flashover situations
x) Water application techniques

Following a verbal assessment of the students to ensure that a thorough theoretical understanding is achieved, the students are allocated breathing apparatus sets, and escorted to the fireground for the practical session.

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> *Following a verbal assessment of the students to ensure that a thorough theoretical understanding is achieved, the students are allocated breathing apparatus sets, and escorted to the fireground for the practical session.*

effective seal on the facemask of the breathing apparatus set is emphasised to students. Training within the UK has recently placed even more emphasis on this test being conducted satisfactorily and documented accordingly. There are many reasons for this, but specifically relating to fire behaviour, it is necessary to have a good seal if a situation arises where a fire fighter is unable to maintain a stance below the neutral plane. If this situation does occur, there is a real possibility that the positive pressure above the neutral plane (in the ‘over’ pressure area) is greater than the positive pressure coming out of a potential leak around the facemask. The result is that contaminants, hot gases and heat will then find their way within the facemask and potentially threaten the well being of that fire-fighter.

The first part of a three part practical presentation is a demonstration of a flashover situation. The students are taken into a ‘demo’ unit in full fire kit and breathing apparatus. They are ordered to sit down along each wall and observe the different stages of a fire. As fire fighters, they are able to see how an initial fire goes through the various stages i.e. developing fire, to flashover, to fully developed, to smouldering fire.

The fuel loading within the end of the unit is 100% untreated wooden pallets. It is emphasised however, that the fuel loading in a domestic kitchen or bedroom (for example) would have a much higher calorific value than the demonstration. Bearing in mind the intensity of the fire within the unit, it perhaps prepares the fire fighters on how intense ‘real life’ incidents could be.

The demonstration area is loaded with pallets on both sides, the rear of the unit and the ceiling. A small kindling fire in the corner is then ignited. As the fire develops, all the usual signs and indicators of a flashover are recognised by the trainer and observed by the students (these are pyrolisation of objects, a rapid increase in temperature, tongues of flame in the smoke layer and a low neutral plane). The unit also has a roof vent, primarily for safety reasons following the risk assessment of the unit. However, this is a useful tool in explaining the art of effective ventilation. By opening the vent, which is probably only a metre square, the neutral plane visibly rises by about half a metre, but at the same time, the fire intensifies, as you would expect.

The second part of the practical element of the course involves creation of a series of backdraughts. Naturally the

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students observe this from outside the metal unit. The unit itself is loaded, again using wooden pallets rather than treated wood or chipboard. The wood is then ignited, and taken to a fully developed fire and allowed to burn for a while, at which time the trainer explains what is occurring and what signs and indicators of a backdraught they are likely to see (these would be a low neutral plane, smoke pulsing through gaps in doors and windows, the inrush of air at the bottom half of the door or metal 'window' opened and the outrush of typically fuel rich smoke on the upper part of the exhaust).

The final part of the practical demonstration is designed to give the student an opportunity to apply water in both the direct and indirect modes, but specifically, the techniques to be adopted when gas cooling. In order to teach this, a specially designed unit is used which injects paraffin at a predetermined pressure, onto a small carbonaceous fire. The result of this action is that a ball of flame is projected through the unit towards the fire fighters, who are armed with a pressurised branch and are in full PPE including breathing apparatus.

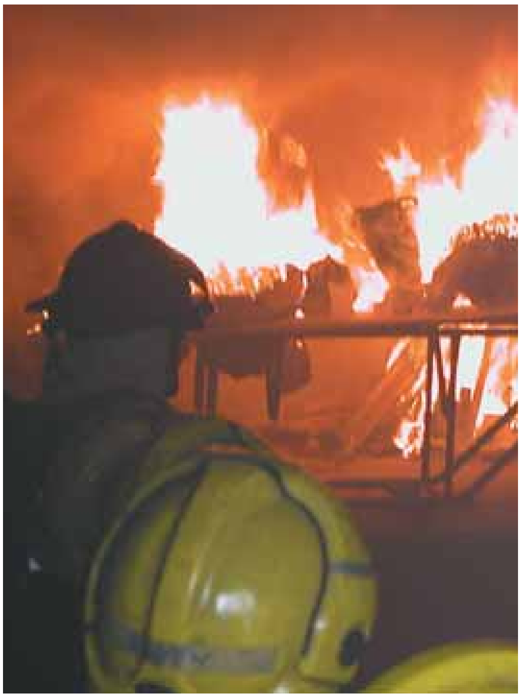
The three principles that the fire fighters are taught are as follows:

a) Spray setting of branch

b) Length of pulse

c) Position of spray cone

The setting of the spray on the branch is very important. Due to the necessity to avoid putting too much water on the fire or in the gases, the spray setting is determined by the width of the compartment. The students are taught that the length of pulse should be more or less the same no matter what the width of the compartment that they are attempting to move through is. Thus, in order to prevent a situation where the fire could possibly come around the back of the fire fighters, it is important that the correct setting is achieved.



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In c) above, students are again reminded on the position of positive pressures and negative pressures (over pressure and under pressure) and the neutral plane. They are then taught to maintain the bottom of the spray cone right on the neutral plane if possible. Failure to do such results in lowering of the neutral plane and creation of a more uncontrollable environment. In order that an understanding of this is highlighted, the incorrect methods of spraying below the neutral plane, and being on the wrong branch setting are demonstrated, consequently portraying a valuable lesson to the student.

PPV AND THE LINK

Positive Pressure Ventilation skills are currently being developed within Lancashire. At this time, Lancashire is still strictly 'post fire' or phase 1. However, as a Fire Service, most of the personnel are now trained to operate PPV in both the defensive and offensive modes (phase 2 and phase 3).

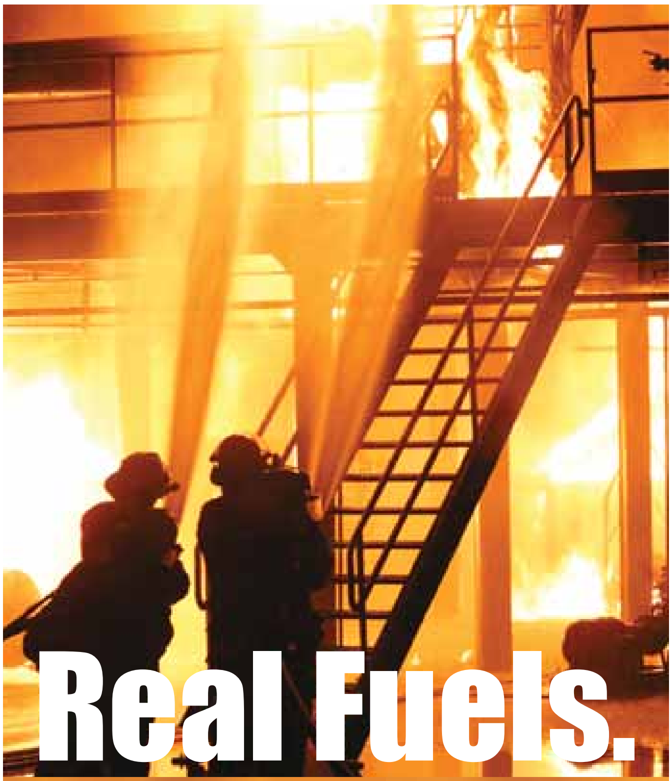
Clearly in backdraught situations, PPV is a non-starter. However, relating to the core of this article (that being a knowledge and understanding of flashovers) providing that all the necessary safety measures are adhered to and the risk assessment dictates that PPV could be used in a particular situation, there should be little problem in effectively dealing with a flashover using PPV.

CONCLUSION

It is refreshing to see that the world generally is initiating a greater understanding of phenomenon's such as flashover and backdraughts, and ultimately training the people who matter; the fire fighters.

Many deaths over the years have been as a result of flashovers and backdraughts and even the less common fire gas explosion. These not only include members of the public, but fire fighters themselves, despite the impressive improvement of the standards of PPE (Personal Protective Equipment). Maintaining and improving the knowledge and understanding of such scenarios can only serve towards a safer working environment for the fire fighter and the population of the world in general.

Gary West, CertEd, is a Course Director at Washington Hall International Training and Development Centre and an experienced fire officer both operationally and as a trainer. His personal experienced of flashovers and backdraughts are numerous. Mr West is part of the National Steering Group in CFB Training and a Regional Representative for that group. His work involves communicating closely with Sweden, the USA and Australia in many fields but specifically CFBT. Gary can be reached at garywest@lancsfirerescue.org.uk



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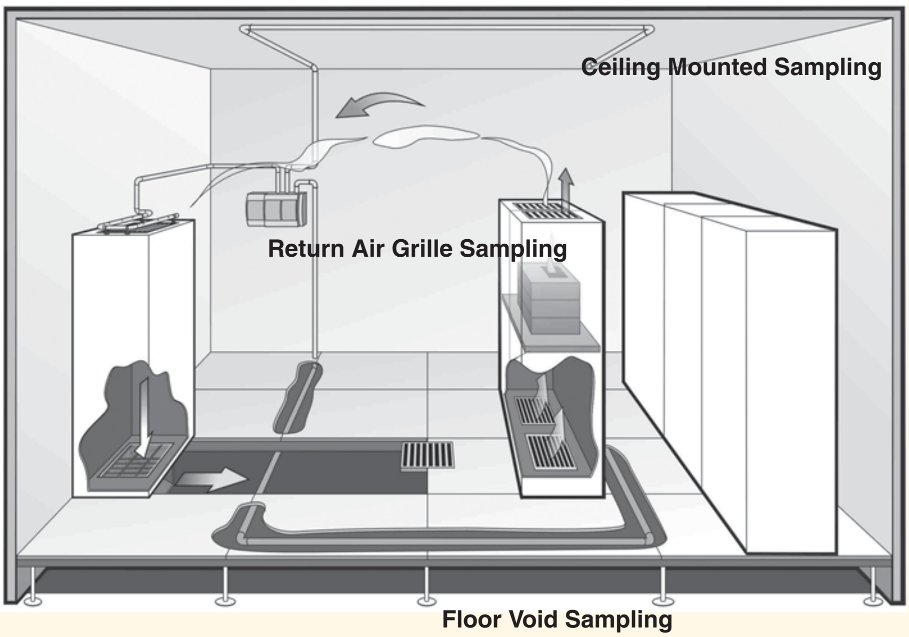


Picture courtesy of Vision Fire & Security

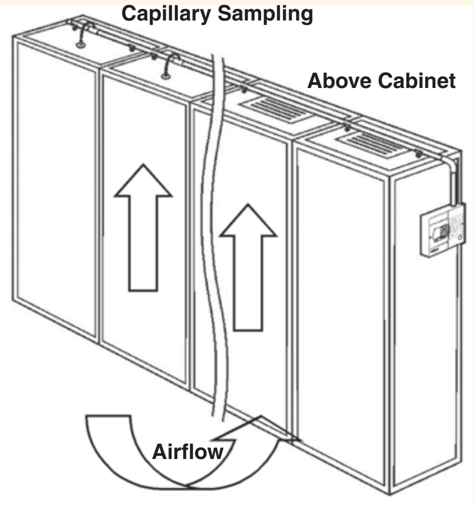
THE EFFECTS OF A FIRE EVENT can be devastating, whether the fire occurs in a home or business. However, the consequences of such an event at a nuclear power plant can affect the health and welfare of neighbours and employees, have long-term implications for the environment, and disrupt the supply of electricity that is central to the lives of millions of customers.

A fire at the Browns Ferry Nuclear Power Plant, on March 22, 1975, was a pivotal event that brought fundamental change to fire protection and its regulation in the U.S. nuclear power industry. The fire started when plant workers in the cable spreading room used a candle to test for air leakage through a non-fire-rated (i.e. polyurethane foam) penetration seal that led to the reactor building. The fire ignited both the seal material and the electrical cables that passed through it, and burned for almost 7 hours before it was extinguished. More than 1600 cables were affected and, of those, 628 were important to safety.

The fire damaged electrical power, plant control systems, and instrumentation cables that impaired the functioning of both the normal and standby reactor cooling systems, and affected the plant monitoring capability for the operators. Given the loss of many safety systems, the plant operators had to perform emergency repairs in order to restore the plant's systems needed to place the reactor in a safe shutdown condition.

The investigations that followed the Browns Ferry fire identified significant deficiencies, both in the design of fire protection features at nuclear power plants and in the plant procedures for responding to a fire event. The investigators concluded that the occupant safety and property protection concerns of fire insurance companies did not sufficiently encompass nuclear safety issues, especially in terms of the potential for fire damage to cause the failure of redundant divisions of systems and components important for safe reactor shutdown. Today the fire protection programs for nuclear power plants must ensure the primary goals of minimising both the probability of occurrence, and consequences of fire. To meet these goals, the fire protection system must provide reasonable assurance that a fire will not prevent the performance of necessary safe shutdown functions and will not significantly increase the risk of radioactive releases to the environment. The primary fire protection program objectives for operating reactors are to:

- Prevent fires from starting,
- Detect, rapidly control, and promptly extinguish those fires that do occur, and
- Ensure that structures, systems, and components needed for safe shutdown are protected against a fire that is not promptly extinguished.



Picture courtesy of Vision Fire & Security

In response to the need for reduced building costs while providing increased safety, performance-based building codes are being developed in many countries. It is now widely accepted that professional risk management techniques will permit the most cost-effective and reliable solutions to be implemented.

Bruce Power, Canada, has accomplished an example of a performance-based approach that meets the objectives stated above. In 1999, Bruce Power began an upgrade project to retrofit two plants that were designed

oke Detection in Nuclear acilities

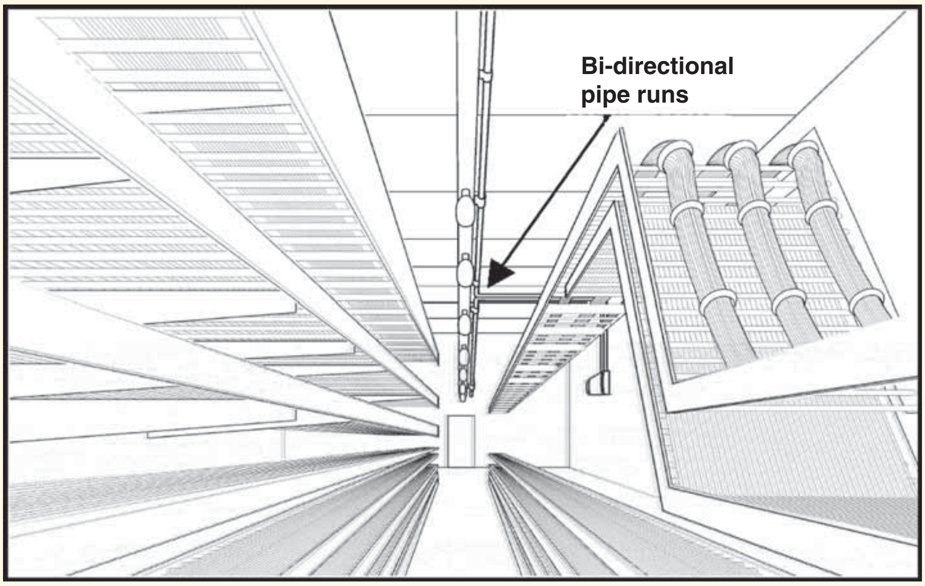
and built in the 1970s, with a focus on the application of performance-based fire protection. The project represented the single largest fire protection upgrade in the nuclear industry.

Due to the magnitude of the plants' fire protection upgrades, Bruce Power actively worked with the NFPA to develop solutions to the unique problems they faced. At the company's request, NFPA convened a meeting of the Technical Committee for Nuclear Facilities, which encompassed NFPA 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants*. This provided an opportunity to consider how performance-based options can be practically and effectively applied to upgrade situations.

BEYOND THE CONVENTIONAL DESIGN TECHNIQUES

Although the design of fire protection systems has primarily been based on traditional prescriptive fire codes, there is an increasing emphasis on performance-based codes that address individual environment requirements. Performance-based design determines the best fire protection system by assessing the function, risk factors, and internal configuration and conditions of a specific environment. When designing a Fire Detection System the designer must consider the:

- airflow characteristics and the air change rate within the room
- coverage area per detector and sensitivity required
- room size and characteristics – raised floor, tall ceilings etc
- environmental factors that may effect the detection system
- annunciation of emergency response systems
- activation of mechanical control systems such as air extraction and suppression systems



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APPLICATIONS WITHIN NUCLEAR FACILITIES

Bruce Power (see introduction) uses VESDA aspirating smoke detection systems in all of its control equipment rooms, cable-spreading areas, and in many of its electrical safety environments. These areas have a fire loading that would typically produce a slow, smouldering event or an overheating electrical/electronic component incident.

CONTROL EQUIPMENT ROOMS

The electrical demand of the in-cabinet equipment is a major fire risk and the primary cause of a fire incident.

CHALLENGES

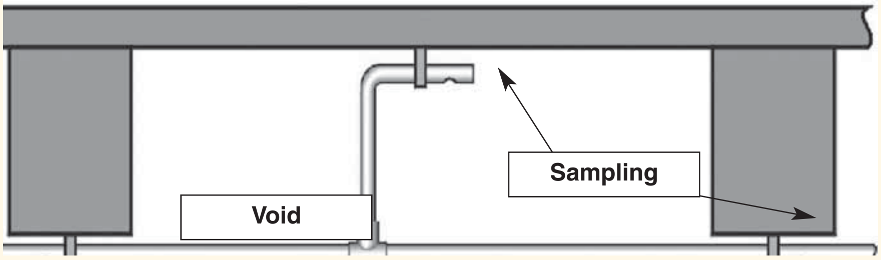
- Low thermal energy of an in-cabinet fire can effect the external detection of smoke during the incipient stage.
- In-cabinet equipment may require a high level of airflow (ventilation) to maintain a suitable operating temperature.
- Forced air ventilation increases the incidence of smoke dilution, and impedes the detection of smoke by conventional systems.

SOLUTION

Locating sampling pipework on the ceiling, under the floor void and across the return air grille of the air conditioning unit provides the earliest detection at the crucial (incipient) stage.

Additionally, the high concentration of cabinet enclosed equipment and consoles may necessitate direct in-cabinet sampling. Electrical, relay and communication equipment is typically located in enclosed cabinets. The cabinets are usually fully enclosed, or have a ventilation system.

The ventilation system may either be via a top vented grille or as forced ventilation with fans or grilles located within the cabinet. The incidence of overheating is the main fire risk



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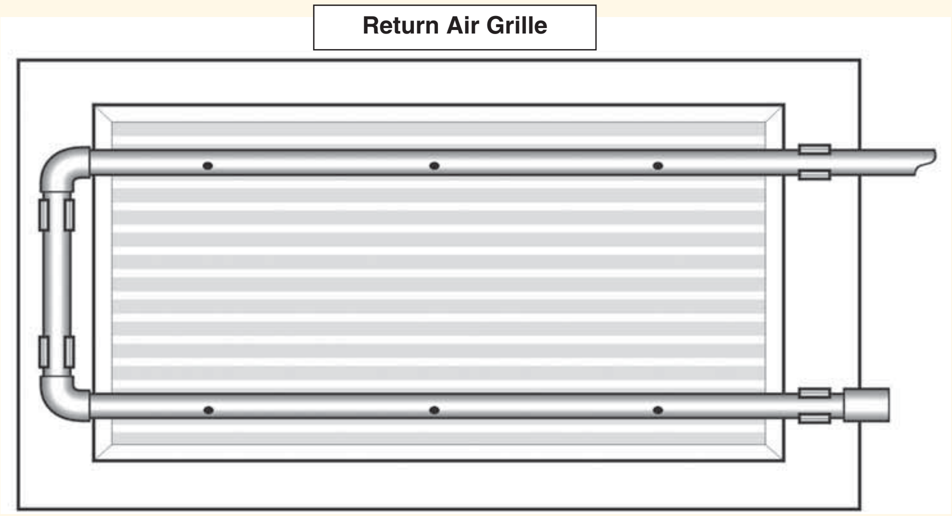

Picture courtesy of Vision Fire & Security

of cabinet-enclosed equipment and wiring. The external detection of smoke may not register until a fire has progressed to an advanced stage of growth and caused a significant amount of damage.

Low thermal energy, poor ventilation, or in some cases forced in-cabinet ventilation can affect the detection capability of a conventional smoke detector.

CABLE TUNNELS AND CHAMBERS

Containing meters of communication, power and control cabling, the tunnels provide an integral link between the critical operational areas of Control Room, Switch Room and High/Low Voltage Annexes.

The continuous concentrated level of power located along the cables further increases the fire risk, as the cables are then grouped together and overlaid. Classified as a high fire risk, Cable Chambers are generally confined spaces that are located below ground level, and have limited airflow.

CHALLENGES

- The main fire risk is the concentrated and constant level of power transported along the cables.
- Located underground and typically classified as hostile, confined space, cable tunnels exhibit an increased level of ambient pollution.
- Not only can the configuration and location of the tunnels impede general access, but also the response and containment of a fire.

SOLUTION

Installing ceiling mounted pipework with multiple pipe runs provides optimum, earliest warning smoke detection in the Cable Chamber area. The location of sampling holes is usually configured to a code-based format. The presence of ceiling voids may require the installation of Interbeam Sampling via 'walking stick' capillary pipework.

Sampling holes beneath the beams is also permissible and provides improved detection. This is especially recommended when beam depth is large or height above floor level is high.

GENERATOR HALLS

The generator halls generally have roof heights exceeding 10 metres which makes it very difficult for conventional point type smoke detectors to detect low levels of smoke or small increases in the ambient level of smoke. Stratification or thermal layering of the air at these heights may stop smoke reaching roof level at all. A carefully designed ASD system will take this into consideration and allow for sample points at various heights to compensate for stratification.

Sampling the return air grilles located in these spaces increases the speed of detection of an incipient fire condition, due to the predominant effect of the high air exchange rates on the airflow patterns in the space. Smoke from an incipient fire has little plume strength and its path will be primarily governed by the airflow patterns present in the room. The cumulative effect of several sampling points drawing in smoke enhances the effective sensitivity of an air sampling type detection system. The sampling of multiple sampling points with both upper and lower levels being monitored, as well as monitoring the return air grilles by the same detector, tends to maximize this effect.

> *Low thermal energy, poor ventilation, or in some cases forced in-cabinet ventilation can affect the detection capability of a conventional smoke detector.*

CONCLUSION

The most important system that contributes to the prevention of fire is Very Early Warning Smoke Detection system that meets the performance objective to detect smoke at the very early stage of a fire in adverse range of applications. The system features provide the designer flexibility by meeting design requirements of prescriptive codes as well as meeting today's performance-based approach. These enabling features include:

- Aggregate air sampling provides benefits in large area detection
- Low Maintenance Costs
- Flexibility to design Pipe Network to suit the environmental conditions
- Wide Detection Range with Multiple Alarm levels that can be used to:
  - reliable early warning (to fire wardens, brigades, etc.)
  - initiation of staged evacuation
  - initiation of orderly shutdown of power or air extraction systems
  - initiation of automatic suppression

VESDA LaserFOCUS™

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CROMWELL

The Name That Fire Fighters Trust

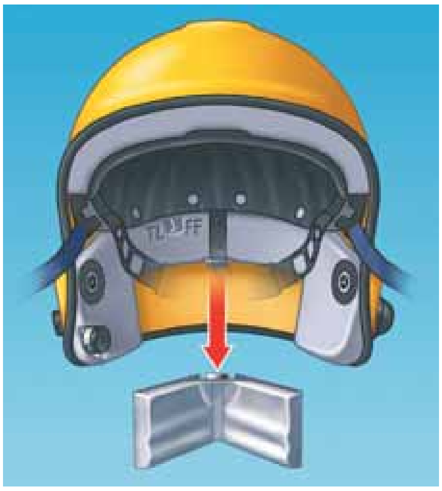
HELMET INTEGRATED SYSTEMS LTD. based in Stranraer, Scotland, designs and manufactures the Cromwell range of helmets and communications, used and proven operationally by fire and emergency services throughout the world.

The Cromwell F600 jet style helmet and face shield

CROMWELL F600 – the ultimate in protection and comfort

The company's leading fire fighting helmet – the jet style Cromwell F600 – features a modular helmet and face shield configuration, which adapts to individual operational needs using easily replaced components. This concept reduces through life costs, enabling the service life of the helmet to be significantly extended without compromising performance.

The outer shell of the F600 is manufactured from pre-impregnated glass fibre with a flame retardant urethane/acrylic finish and is fitted with an internal expanded polystyrene impact liner.



The Cromwell ECHO with built-in cordless radio

A high impact resistant, optically correct, polycarbonate face shield with an anti-mist, anti-scratch coating is fitted to the helmet shell and locates behind a cover when fully retracted. The face shield cover also provides a clearly visible surface for rank markings.

The F600 has proved to be a popular choice amongst fire fighters – now used by over 50% of UK fire services, by international fire and rescue services throughout Europe, the Asia Pacific region, and more recently China.

Existing users of the Cromwell F600 have reported excellent wearer comfort with the helmet being worn for longer periods during arduous duties. The helmet's simple and rapid multi-point adjustment accommodates different head shapes and sizes enabling fire fighters to achieve the optimum combination of comfort, balance and retention.

The F600 was also the first helmet system to achieve dual CE certification for helmet (EN 443) and face shield (EN 166) – a vital reassurance that it has been tested and approved to stringent specifications that will ensure the highest standards of protection.

CROMWELL ECHO – a unique communications solution

The Cromwell ECHO fire fighters helmet provides a unique solution to the problem of ensuring effective radio communications for emergency personnel who have to enter areas requiring the use of breathing apparatus, anti-flash hoods, and chemical/gas tight clothing.

Offering the latest technology multi-way cordless radio communications between members of fire fighting teams and a forward control position, the ECHO was originally developed for the UK Royal Navy, who wanted a helmet with integral radio to provide excellent communications during critical fire and damage control operations on board ship. Following successful trials, the ECHO, which is now fully NATO coded, has been adopted by the UK Royal Navy for use on all vessels, surface and submarine.

Similar conditions combining high ambient noise, high temperature, confined or underground locations, potentially explosive atmospheres, and areas where radio communications are difficult, are also experienced by the international fire and rescue services.

By integrating a duplex radio system, bone microphone, push to talk (PTT) switch, shielded radio antenna and channel selector components within the helmet, the firefighter can easily access the radio controls. Additionally when wearing a gas tight suit, it is possible for the wearer to depress the PTT button by pushing against the flexible face shield of the suit.

The radio, which is intrinsically safe to Eex ib IIC T3, is fitted with padded, passive noise attenuating ear cushions to optimise wearer comfort and to maximise the clarity of voice reception in adverse conditions.

A key feature of the ECHO is a switch inside the helmet that enables the radio to be set to either 'Team Leader' or 'Firefighter' mode. When set to 'Team Leader' mode this switch enables all transmissions to be overridden by the designated Team Leader who can simultaneously pass instructions to all members of the fire fighting team and to the forward control position. A separate hand-held radio is also provided for use by the 'Forward Controller' or alternatively another ECHO helmet can be deployed.

ECHO has a line of sight transmission range of 1.5 miles, and is capable of communication with up to 16 fire fighting teams using a channel-changing switch mounted at the front of the helmet. A series of audio tones indicate various battery states, time out warning, and incorrect channel selection. The re-chargeable nickel metal hydride battery provides a duration of four hours on a typical duty cycle of transmit, receive and standby.

The helmet shell shares the same specification as the Cromwell F600 CE marked BS/EN 443, including wet helmet and surface insulation tests. A BS/EN 166 approved faceshield can also be fitted if required.

Operational experience has demonstrated that the Cromwell ECHO significantly enhances communications capability in conditions where traditional radios have been ineffective, enabling commands to be transmitted and received loudly and clearly without distortion.

This capability is easily established through the use of trial and evaluation helmets that are provided to potential customers by Helmet Integrated Systems.

For further information, please contact:

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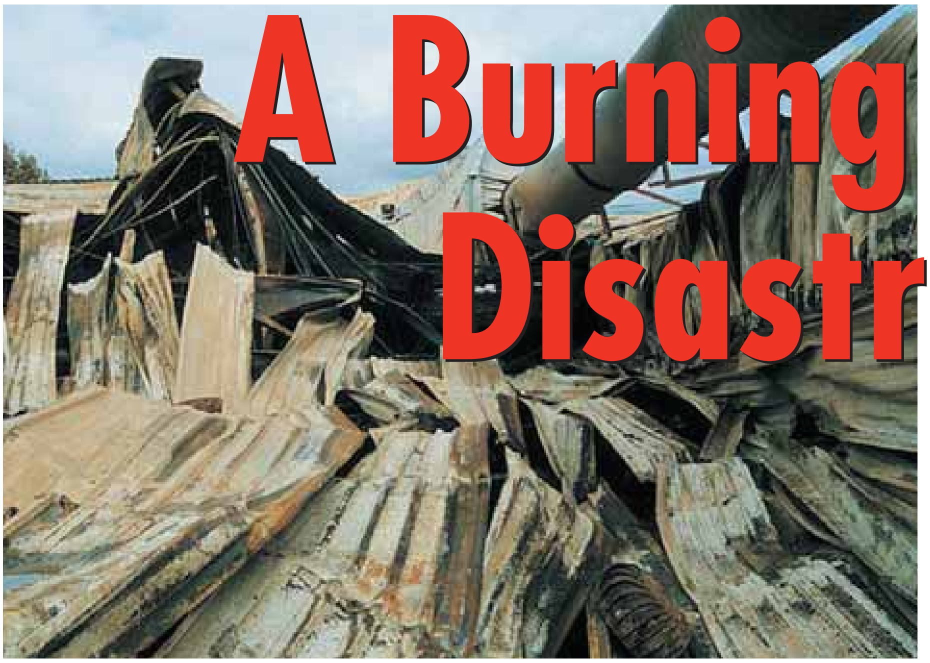
By Chan Kai Foo
Chief Engineering Technical Specialist, Asian Operations, FM Global



Failed hot work management was the likely cause of this business going out of business.

Picture courtesy of FM Global

POOR HOT WORK MANAGEMENT is one of the leading causes of multi-million dollar fires and explosions at commercial and industrial facilities. But it is also one of the most preventable hazards. Yet, improper hot work practices continue to be a costly problem for property and business unit owners.

Commercial and industrial property insurer FM Global believes that the majority of all hot-work-related fires are preventable. That's why, for the past year, FM Global engineers and researchers, along with an internationally recognized testing laboratory FM Approvals (a business unit of FM Global), have been studying the various threats associated with hot work procedures (e.g., welding, cutting, grinding, brazing and torch-applied roofing) and testing the products that are designed to prevent them.

The study found that hot-work-related disasters reported to FM Global average nearly US$2 million per incident (Note: Since 1993, three out of every four such fires were caused by cutting or welding torches). The business interruption and intangible impact (e.g., reputation, loss of market share) such fires cause are incalculably costly.

Another disturbing finding was uncovered, i.e. the risk of fire at commercial and industrial facilities can more than double when outside contractors perform unsupervised hot work. During the past two decades, contractors have accounted for nearly 75 percent of hot work losses at FM Global-insured properties.

Their research led to the development of *Approval Standard 4950, "Welding Pads, Welding Blankets and Welding Curtains for Hot Work Operations,"* a first-of-its-kind testing standard that specifically identifies products that can prevent potentially catastrophic hazards of hot work.

> *All too often, however, it's not that the contractors or employees performing the hot work are irresponsible; they simply make mistakes, or they aren't aware of the hazards and the steps that are necessary to mitigate or prevent property loss.*

UNDERSTANDING THE HAZARD OF POOR HOT WORK MANAGEMENT

In most cases, hot work losses occur when companies, employees or contractors fail to follow proper hot work safety guidelines. These guidelines are as simple as implementing hot work permit systems (a precautions checklist highlighting important steps to take during hot work operations), using alternative cutting or joining methods, moving hot work to safe areas, conducting proper training and providing adequate supervision.

All too often, however, it's not that the contractors or employees performing the hot work are irresponsible; they simply make mistakes, or they aren't aware of the hazards and the steps that are necessary to mitigate or prevent property loss. Sometimes, workers become complacent and are lulled into a false sense of security, especially at facilities where hot work is conducted routinely. As a result, precautions that may appear insignificant are not followed as strictly as they should be.

Of course, there are steps that contractors and facility managers can take to reduce the dangerous risks of hot work. For instance, discussing hot work projects prior to performing any job is a crucial first step. Managers should also inform contractors of their company's hot work policies and regulations and insist that they be followed, even sign a contract stating so. Hot work should always be supervised by a specially trained "fire watch," someone from the facility who can observe the hot work operations and be ready with hot work protection and fire protection equipment whenever necessary.

Due to hot work's volatile nature, it is imperative to adhere to every precaution. Sparks and molten slag (residue) from cutting and welding can easily ignite

n: Can We Prevent Work Fires?

Picture courtesy of FM Global

combustible materials that are located below or near hot work areas. But hot work hazards aren't always so obvious, even to seasoned hot work professionals.

Sparks and molten globules that fly or roll long distances can ignite combustible materials, like insulation, wood particles, or flammable liquid vapors. Sparks also can settle in areas that aren't easily seen. For instance, if they land on the tops of high ledges, or inside vents, recessed walls, floor openings, or ceiling openings, they can smolder undetected for hours before finally igniting a blaze.

What's more, combustible material isn't always visible. Cutting into a metal wall, for example, can ignite combustible insulation inside the wall or anything close to the opposite side of the wall. Flammable deposits, such as vapors or gases which are often invisible, can spark a fire or explosion. Poorly maintained hot work equipment, like hoses or connections that leak gas, is also a prime culprit.

FM GLOBAL APPROVAL STANDARD 4950'S TOUGH TESTING

However, no matter how diligent contractors and facility managers are in following every precaution, it isn't always enough to prevent significant property losses. FM Approvals' extensive evaluations of the available hot work protection products found a large disparity in their quality and effectiveness.

But the good news is that welding pads, welding blankets, and welding curtains that meet FM Approval Standard 4950 are now coming to market to help prevent hot work disasters.

Under Approval Standard 4950, hot work protection products are grouped into three categories: welding pads, welding blankets and welding curtains. As manufacturers are well aware, the different types of hot work operations vary significantly in severity, making it impractical to produce a universal product for all hot work environments.

Hot work protection products need to meet a number of strict guidelines before they are given FM Approval according to Approval Standard 4950. The pads must be capable of resisting burn-through and limiting heat transmission to prevent ignition of combustible materials that may be under them. Welding blankets must meet the latter criteria as well. Welding curtains have to resist melting, burning, burn-through and deformation caused by sparks.

To ensure that they do meet the necessary conditions for Approval, hot work protection products are subjected to a rigorous series of tests, including fire/thermal resistance, charring embrittlement and accelerated weathering.

Testing for fire and thermal resistance begins by positioning test samples of the protection products each measuring approximately 300 mm by 450 mm (12 by 18 inches) in the test area. A 20 mm (¾-inch) thick steel plate is then cut with an automatic oxy-acetylene cutting torch mounted on a cart.

Welding pads and blankets, which are placed horizontally beneath the torch, must withstand the greatest amount of heat and molten metal. Welding curtains are hung vertically to contain sparks and other hot work by-products. Heat resistance is measured by a collection of instruments known as thermocouples. For a product to pass the heat test, temperatures recorded by each thermocouple must not exceed 260°C (500°F).

After the fire and embrittlement tests, hot work protection product samples are subjected to 1,000 hours of accelerated weathering. A test chamber equipped with ultraviolet lights simulates the withering glare of the sun, while a heated water pan provides elevated humidity levels. Once the weathering tests are complete, the samples are once again tested for fire and thermal resistance.

Assuming a product passes all of these harsh tests, it is still not ready for Approval. For that to happen, the manufacturer must implement a quality control program and submit to manufacturing facility inspections. Then, and only then, will the hot work protection product be certified under Approval Standard 4950.

The FM Approval mark on a product assures manufacturers that their products have met FM Approvals' strict property loss prevention standards and helps product buyers make well-informed decisions regarding which materials will best reduce their various property risks. (Note: To learn more about Approval Standard 4950, manufacturers should contact FM Global's Mark Tyrol at + 1 (781) 255-4786, or by e-mail at mark.tyrol@fmglobal.com.)

THE BENEFITS

Improper hot work procedures can be extremely costly. However, these devastating fires can be prevented. Doing so requires the following:

- **Two-way communication between contractors and facility managers** (Open, honest dialogue sets the stage for any hot work operation.)
- **Diligent adherence to safety precautions** (Following proper safety procedures is an essential next step.)
- **Proper use of quality products** (Using FM Approved hot work protection products that meet Approval Standard 4950 is highly recommended.)

For commercial and industrial property owners, as well as contractors and their employees, taking these simple steps could mean all the difference between a minor risk and a major threat to the future of one's business.

FDIC FESA Fire & Emergen

More than 300 delegates and 100 exhibitors from around the world are expected to gather in Singapore between February 22–26 for the ***Fire & Emergency Services Asia 2005***. This five-day conference, exhibition come hands-on-training (HOT) session is jointly organised by the National Fire Prevention Council, Singapore (NFPC) and ***PennWell****, with the support of **Singapore Civil Defence Force (SCDF)** and the **Fire Safety Managers' Association, Singapore (FSMAS)**. It serves as a platform for emergency responders, fire safety practitioners as well manufacturers and suppliers of fire and emergency equipment to network and exchange knowledge.

PROGRAMME – DAY ONE

Time	OPENING CEREMONY	
0930	Registration of Delegates	
0945	Delegates to be seated	
0955	Arrival of Guest of Honour	
1000	Welcoming Address by Organising Chairman	
1010	Opening Address by Guest of Honour followed by Official Opening of FESA Conference & Exhibition	
1045	Viewing of Exhibition Hall by Guest of Honour	
1205	Reception and Lunch Break	
	PLENARY SESSION 1	
Time	**Title/Topics**	**Names of Speakers**
1330	Consequence Management – Challenges for Emergency Managers	Mr David Templeman, EMA
1410	High-rise Fire Fighting Operations in United States of America	Mr David McGrail, District Chief Denver FD, USA
1450	**Tea/Coffee Breaks**	
1520	Performance-based Approach for Fire Resistance of Steel Structure	Prof Li Guo Qiang Vice President of Tongji University
1600	Fire and Explosion Protection Approaches at Chemical and Petrochemical Facilities	Prof Robert G. Zalosh Professor, University of Maryland
1640	**ENDS**	

PROGRAMME – DAY TWO

	PLENARY SESSION 2	
Time	**Title/Proposed Topics**	**Names of Speakers**
0900	Coordinating the International Response to Sudden Onset of Emergencies and Disasters	*Mr Gerhard Putman-Cramer Deputy Director of OCHA Geneva
0940	Critical Incident Stress Management: Supporting Emergency Services Worker	Dr Rob Robinson Director of Trauma Support Consults Pte. Ltd
1020	**Tea/Coffee Break**	
1045	Safety in Numbers: Using Computer Models to Simulate the Movement and Behaviour of People in Emergency Situations	Prof Edwin R. Galea Director, Fire Safety Engineering Group, University of Grennwich
1125	Managing Downwind Hazards for a Dirty Bomb Incident	Mr Ian Day Training Manager, Bruhn New Tech Limited (BNL)
1205	**Lunch Break**	

	FIRE SAFETY/FIRE PROTECTION (VENUE)		**OPERATIONS & INCIDENT MANAGEMENT (VENUE)**	
Time	**Title/Proposed Topics**	**Names of Speakers**	**Title/Proposed Topics**	**Names of Speakers**
1330	Impact of Security on Emergency Services – A Fire Protection Engineer's Perspective	Mr Jack Woycheese Vice President, International Business Development, Hughes Associates, Inc	INSARAG's Global USAR Operations and Learning Experiences	*Mr Gerhard Putman-Cramer Deputy Director of OCHA Geneva and Chief of the Disaster Response Branch of ICHA
1410	Compartment Fire Simulation Using Zone Models	Dr Remesh Kuzhikkali NTU, Singapore	Developing Strategies against Potential Terrorism Attacks in Cities	*Mr William Bamattre Fire Chief, Los Angeles FD
1450	**Tea/Coffee Break**			
1520	New Zealand's Experiences in Implementing Performance-Based Regulatory	Mr Mike Spearpoint Lecturer in Fire Engineering, University of Canterbury	Advances and Developments in Vehicle Extrication	Mr Brendon Morris Consultation & Training Manager, Holmatro Rescue
1600	Fire Safety & Management of Emergency at Biomedical Research Facilities	Mr David Lam Manager, Bio Safety and Facility, DSO	How to Develop and implement Comprehensive Strategies for High-rise Operations – US Perspectives	*Mr David McGrail District Chief Denver FD, USA
1640	**ENDS**			

ncy Services Asia 2005

CONFERENCE & EXHIBITION (22-24 FEB 2005 AT SUNTEC SICEC)

The first component of the event is a three-day conference cum exhibition to be held at the Suntec Singapore International Convention & Exhibition Centre. Reputable speakers and international practitioners will be sharing knowledge on topics such as mass transit disasters, community emergency preparedness, the performance-based regulatory system, protection of highrise buildings and many more interesting subjects.

HANDS-ON-TRAINING (25-26 FEB 2005 AT CIVIL DEFENCE ACADEMY)

This will be followed by two days of hands-on-training at the Civil Defence Academy. Specialists from SCDF and leading US fire departments will be conducting lessons on disciplines such as fire-fighting, rescue and medical provision. Five modules will be covered over the two days, namely *Industrial Fire-fighting and Hazmat Mitigations*, *Shipboard Rescue and Fire-fighting*, *Terrorist Chemical Release Interventions*, *Urban Search and Rescue Operations* and *Highrise Fire Protection and Fire-fighting*.

FESA VIP FLY-IN PROGRAMME

No effort has been spared to attract and bring in quality attendees and buyers to the event. The organizers of FESA, has as one of its many promotional activities, the VIP Fly-in Programme. Several Asian fire chiefs have been invited and will be flown in during the event. These include the following:

1 China:

a) Major General Guo Tienan, Director-General, National Fire Dept

b) General Sun Lun, President, China Fire Protection Association

2 Hong Kong SAR:

a) Mr Lam Chun – Man, Anthony, Director, Hong Kong Fire Services Dept

3 Macau SAR:

a) Mr Ma Lo Weng, Director, Macau Fire Department

4 Philippines:

a) Chief Supt Francisco S Senot, Fire Chief, Bureau of Fire Protection

5 Brunei:

a) Mr Hj Awang Johari Jaludin, Director, Fire Services Dept

6 Indonesia:

a) Mr Johny Pangaribuan, Fire Chief, Jakarta Fire Services

7 Taiwan:

a) Mr Chi-Min Hwang, Director-General, National Fire Administration

8 Thailand:

a) Mr Soonthorn Riwleung, Director-General, Department of Disaster Prevention and Mitigation

For the FESA exhibitor this will be a great opportunity to meet with the potential buyers of your equipment and services, all at one convenient location.

FESA exhibitors will also have the added opportunity to showcase or demonstrate their equipment to the Hands-On-Training (HOT) participants, if their equipment is found to be appropriate for the modules being conducted.

As an additional platform, FESA exhibitors can also choose to be involved in the “Product Presentation Workshops”. At these workshops, exhibitors can make a presentation regarding their respective products and services to the various participants and trade visitors.

Please see our advertisement on page 16 for contact details.

PROGRAMME – DAY THREE

	TECHNOLOGY & RESEARCH (VENUE)		COMMMUNITY INVOLVEMENT & EMERGENCY PREPAREDNESS (VENUE)	
Time	**Title/Proposed Topics**	**Names of Speakers**	**Title/Proposed Topics**	**Names of Speakers**
0900	Protection of Non-Storage Occupancies with High Floor-to-Ceiling Clearances	Mr Robert D. Spaulding Manager of Protection Group, FM Global	Living with Terrorism – A Community Involvement Blueprint	LTC N Subhas Director PAD, SCDF
0940	Will A “Level A Suit” Always Get the Job Done? – A reflection on the use of chemical protective suits from the application point of view	Mr John F. Eklund Senior Sales – Product Manager, Trelleborg Protective Products	Cultural Issues in Emergency Response	Dr Thomas D. Phelan President, Strategic Teaching Associates, Inc. USA
1020	**Tea/Coffee Break**			
1045	Structural Fire Resistance Using Finite Element Method	A/P Tan Kang Hai NTU, Singapore	Protection of Buildings against Multiple-Hazards	Professor Tso-Chien Pan Director Protective Technology Research Centre, School of Civil and Environment Engineering, NTU
1125	Advances in Protection of Steel Structures	Dr Lennon Tom Principal Fire Consultant, Fire Safety Engineering	Building of Effective Disaster Management Capabilities: Gujarat Case Studies	Mr Jan V. Meerteens Director, International Centre for Extrication Techniques
1205	**Lunch Break**			

PLENARY SESSION 3		
Time	**Title/Proposed Topics**	**Names of Speakers**
1330	Performance based Fire Safety Design of Structure – A Multi-Dimensional Integration	A/P Richard Liew Director, Ctr for Constructor Materials and Technology, NUS
1410	Modeling of Infrastructural Response to Terrorism Attacks	Dr. Joseph D. Baum Director, Centre for Applied Computational Sciences, SAIC
1450	**Tea/Coffee Break**	
1520	Comprehensive Strategies to Prevent and Mitigate Disasters: Critical Elements of Preparedness, Response, and Recovery	Mr Gunnar J. Kuepper Chief of Operations, Emergency & Disaster Management
1600	Preparing Large Cities for Terrorist Attack	*Mr William Bamattre Fire Chief, Los Angeles FD
1640	**Closing Address/ End of Conference**	

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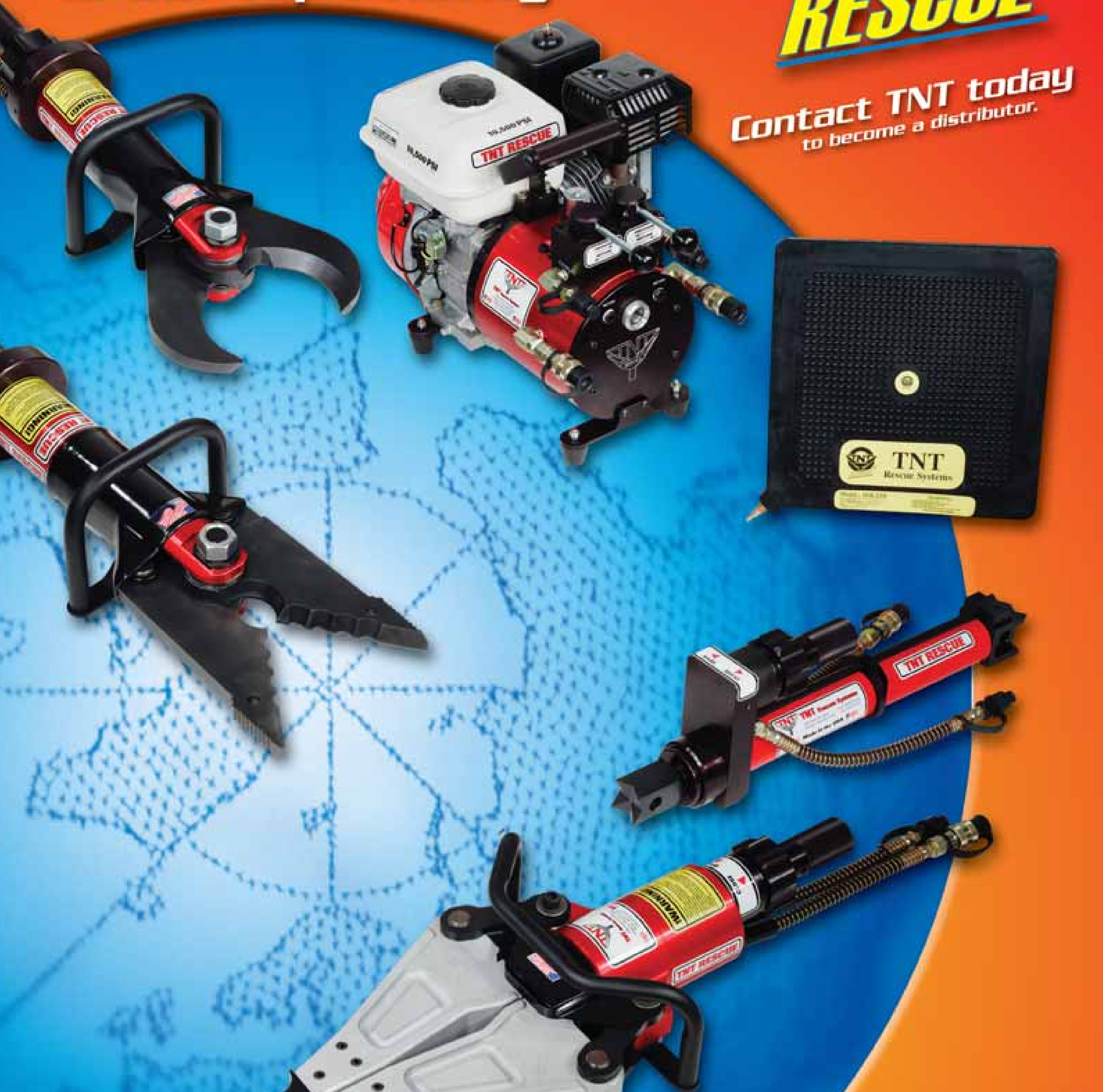

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Issues in Heavy Vehicle Extrication Rescue

By Brendon Morris
Instructor Technical Rescue at Holmatro Rescue Equipment

HEAVY VEHICLE RESCUE REQUIREMENTS for your emergency service can vary widely. Road traffic incidents are just one section of heavy rescue to consider. For the purpose of this article I will focus my discussion on the areas of Heavy Goods Vehicle (HGV) incidents and incidents involving buses.

GENERAL POINTS REGARDING HEAVY GOODS VEHICLE INCIDENTS

Safety always comes first. Always remember that HGV's are designed to carry loads and in most cases they will be loaded (It is expensive for transport companies to have a HGV on the road with no load.) These loads may well be hazardous. Always keep a lookout for HAZMAT signs and warnings. If there is a hazardous load always be sure to deal with this as a priority.

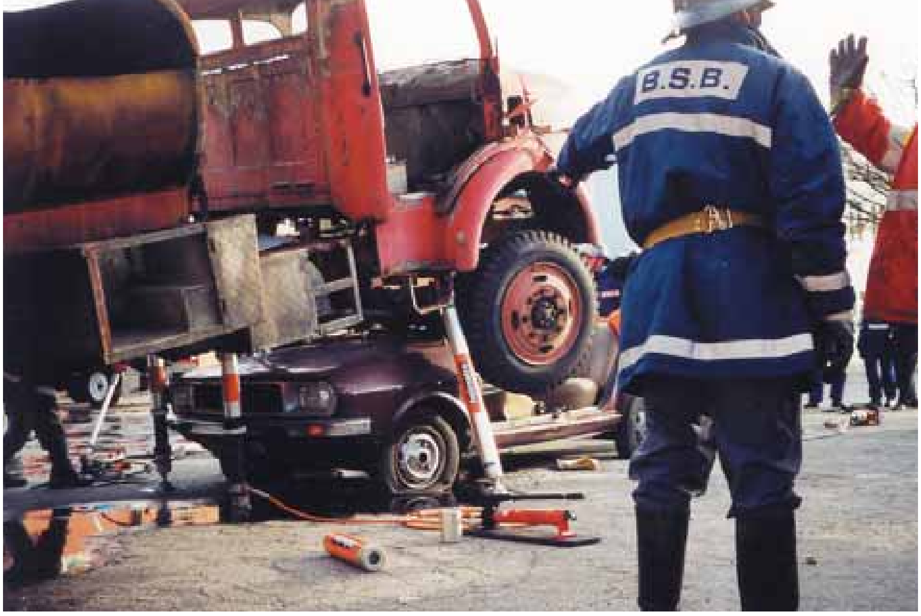
HGV's are not just large cars. They have an entirely different construction. One of the main differences between HGV's and regular vehicles is the suspension. Suspension on HGV's is designed for heavy loads. This means that it is much harder than regular suspension. Believe it or not, this is actually good news for rescuers. In most cases, when required to do extrication work on a HGV directly, it is often not necessary to totally isolate the suspension. However, when complete stabilisation of the HGV *is* required, be aware that this is going to take a lot more than a few step chocks. Do not fall into the trap of shoring against the HGV below the suspension. In the event of a load shift this could render your shoring efforts futile. This may also lead to dangerous situations, especially if the wheels of the vehicle are no longer touching the ground. These dangerous situations can be avoided by always shoring directly against the load.

LIGHT MOTOR VEHICLES VERSUS HEAVY GOODS VEHICLES

Vehicles of different size and weight occupying the same road can lead to interesting and often challenging extrication situations. The added weight of a truck means that it has a lot more momentum than regular passenger vehicles. This makes it a lot easier to slow down a Light Motor Vehicle (LMV) than it is to stop a big truck. Due to the fact that drivers of cars have not normally experienced driving a truck, very often the average car driver has no idea of how hard it is to bring a truck to a stop in a short distance. With this lack of knowledge drivers of small vehicles all too often find themselves in the path of a HGV that cannot stop in time. No guess as to who will turn out second best. Normally in these cases the truck driver is able to simply climb out of his cabin, whereas the occupants of the LMV are entrapped.

Extrication of victims of such an incident can often be complicated by the extensive deformation of the vehicle caused by the HGV. There may also be limited space to work as very often the HGV becomes attached to the LMV. It may be a good idea to practice extrication drills where your team is not allowed to move around one whole side of the vehicle. This will simulate a HGV attached to the vehicle and will give

> *Always keep a lookout for HAZMAT signs and warnings. If there is a hazardous load always be sure to deal with this as a priority.*



In some cases there may be a need for some lifting of the weight of the HGV to allow for extrication

them some idea of the circumstances they may be faced with at such an incident.

One of the most difficult types of collision to handle involving HGV's and LMV's is a LMV that has collided with a stationary HGV. This could be into the front, side or rear of the HGV. In many cases this will lead to the LMV submarining under the HGV. This is the case especially with side or rear impacts into the trailer section of an articulated HGV, due to the fact that the vehicle can move in far under this section. The good news it that in many countries there is now legislation enforcing HGV's to have special anti-under-run bars mounted to their trailers.

Even in the case of impact with the front of a HGV there can be a certain amount of under-run. No matter where the collision occurs, the same problems will have to be faced by the rescuers. Firstly the limited working space can be a problem due to the HGV heavily infringing on the working area. Secondly the extrication process can be complicated by the fact that the LMV has moved in far under the HGV. This will call for good stabilisation of the HGV before cutting. In some cases there may well even be a need for some lifting of the weight of the HGV to allow for extrication. Shoring systems with some heavy lifting capacity can be very helpful in this case. Bear in mind that if you are using other lifting systems such as lifting bags you must be sure to follow up any lifting with good shoring.

BUS INCIDENTS

A bus collision or for that matter any collision involving mass transit vehicles is a challenge to emergency services. In the case of buses, the incidents that result in a great numbers of victims usually have an off-road nature. That is to say we usually see that the most challenging bus incidents are those where the bus has left the road.

Stabilisation of a bus involved in some types of collisions is generally

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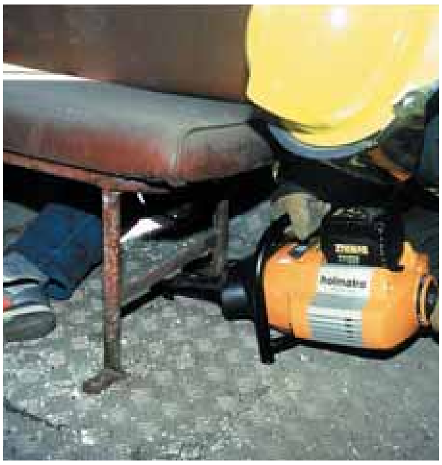
limited to securing it in place especially if it is on a slope. Be sure to make use of an appropriated devise and anchor for securing a bus. Do not underestimate the weight of the bus and its likelihood for moving. In the event of a bus no longer on its wheels, the following situations may have to be controlled.

If the bus is on its side it is normally pretty stable. It may well be necessary to do some lifting of the bus as passengers may be trapped in some way between the bus and the ground. High pressure lifting bags work well in this case. Make sure you lift on a stable part of the bus, as the pillars and roof that are damaged during the rolling may not be able to support the weight of the bus when you lift.

If the bus ends up on its roof this can lead to exceptionally difficult extrication situations. In most cases, especially with double level buses, the roof and pillars will almost certainly buckle under the load of the bus. Be very careful to place shoring between the bus and the ground before starting to work on the pillars of the bus. Removal of just one pillar may well be the small change that causes total collapse of the rest of the pillars.

The seats' buckling causes most entrapments in buses. In this case there may well be the need to use hydraulics inside the bus to free the entrapped victims. However generally there will not be a need for heavy-duty hydraulics. You may well find that using cordless self-contained rescue tools can be a lot easier than negotiating hydraulic hoses in and out of an opening in the bus. If you have regular pump-driven hydraulics you may want to make use of a Combi-Tool over a cutter and spreader that will require more space and more tool swapping.



A cordless self-contained rescue tool is very suitable for use in situations where entrapped people need to be extricated from their buckled seats in a wrecked bus

CONCLUSION

No matter what heavy vehicle rescue situation you find yourself in, always be aware that the heavy nature of the vehicles involved makes them far less forgiving of small mistakes. Remember safety has to come first. So be sure what you are doing is safe. Always try to build stability from the ground up. And finally always remember that you may find yourself on the scene for longer than usual, so think early about getting extra resources.

About the author

Brendon Morris is Instructor Technical Rescue at Holmatro Rescue Equipment in The Netherlands. Brendon has been academically trained in both medical and technical rescue. His extensive experience in the extrication of victims from vehicles was generated in South Africa, where he was employed as Rescue Paramedic in the service of an ambulance and rescue team. He was also attached as a teacher to the Department of Emergency Medical Care & Rescue of the Durban University of Technology. In his present position he trains fire brigades, rescue services and training schools all over the world. Through the exchange of knowledge and experience during these training sessions, Brendon is kept abreast continuously of the latest developments in the field of technical rescue.

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Foam Water Sprinkler Systems

By Mike Willson
of Angus Fire

Picture courtesy of Angus Fire

The Proportioning Challenge

WE ALL KNOW THAT water alone is highly effective in the control and extinction of carbonaceous materials. Water sprinklers do an excellent job and will continue doing so in the future, to protect these risks all around the world.

Modern industry is also demanding an increasing complexity and volatility of flammable liquid materials. These are stored to produce ever-growing quantities of products from larger and faster processing units, supplying larger and more diverse retail outlets, via quicker and bigger distribution warehouses.

The risks are real, bigger than before, and more catastrophic when fire strikes. Unless we are properly prepared, potential losses can rapidly escalate. Recent fire losses in flammable liquid warehousing, processing facilities and retail outlets protected by conventional closed-head sprinkler systems have proven that water alone cannot be relied on to provide adequate fire protection for such applications.

These flammable liquids either float on or mix with water, and so water alone causes fires to rapidly spread and escalate, leading to potentially massive financial losses. This can result in total loss of buildings and contents not to mention the obvious dangers to personnel. Another solution is required to solve this problem and minimise these losses – the foam solution.

Recent fire losses in flammable liquid warehousing, processing facilities and retail outlets protected by conventional closed-head sprinkler systems have proven that water alone cannot be relied on to provide adequate fire protection for such applications.

WHY FOAM?

Fire fighting foams have been successfully used for many years to extinguish bulk storage flammable liquid fires. They provide not only rapid fire

Foam Water Sprinkler Systems

control, but also post-fire security that prevents flashbacks and reignition.

By introducing foam into water sprinkler systems the fire fighting ability is dramatically enhanced to cope with flammable liquid risks. In particular, wet pipe systems that are best suited to foam applications offer the fastest, simplest and most reliable solution of all. Fire tests undertaken by insurance organisations and research groups have conclusively shown that Foam Water Sprinkler Systems (FWSS) provide greatly improved extinguishment times, reduced chances of reignition, lower risk to personnel, less water damage, less pollution and significantly reduced consequential losses.

Picture courtesy of Angus Fire

WHICH FOAM?

Anyone who has been involved with fire fighting foams will know that a vast array of products exist. Some are formulated only for use on hydrocarbons, others need to be well mixed with air before they will work efficiently, and some are potentially damaging to the environment. The complexity of the FWSS application demands the most versatile and flexible of foam concentrates. Usually there is a cocktail of flammable liquids present including hydrocarbons (e.g. white spirit, paraffin, toluene, camphor, creosote, lubricating oils and vegetable oils) and water miscible solvents (e.g. Acetone, Methanol, Isopropanol, Methyl Ethyl Ketone).

The list is endless and the quantities of such chemicals being stored vary, but continue to grow.

To cope with such mixed risks, the only choice is an Alcohol Resistant (AR) type foam concentrate. AR foams are effective not only on hydrocarbons, but also on the polar solvents that destroy all standard foam types from basic proteins to AFFFs!

Many Alcohol Resistant foams contain a water-soluble polymer, which protects the foam against solvent attack by forming a skin over the solvent that allows an extinguishing foam layer to form. Many Alcohol Resistant foams, whilst effective at just 3% induction (3 parts foam concentrate to 97 parts water) on hydrocarbon fuels, require twice as much concentrate (6% induction), for use on Polar Solvents. This higher rate is principally required to produce sufficient polymer to form the skin over a solvent and provide a self-repairing system, should that skin be broken by rescue personnel. In an FWSS, this 6% induction requirement presents some significant problems. Twice as much foam concentrate will be required as well as twice as much valuable space for storage. Costs of the proportioning system are therefore also significantly increased. So 3-3 versions are the most cost-effective option. But a new foam type without this thick polymer is now available, a high fluidity 3-3 AR-FFFP (Alcohol Resistant Film Forming FluoroProtein) called Niagara.

System cost savings can also be achieved by choosing such an AR-FFFP. Unlike synthetic polymer containing AR-AFFF foams, these foams do not attack mild steel distribution pipe, can be stored in unlined mild steel drums, and actually inhibit corrosion. They also have superior environmental performance being detergent free. Detergent is the most acutely toxic of all foam ingredients to aquatic organisms in the environment.

Even if the design requirement of the sprinkler system is currently for hydrocarbon liquid risks only, future needs should be considered. We face a decade of rapid change – the warehouse storing only creosote, engine and vegetable oils today will almost certainly be storing polar solvents like anti-freeze, cosmetics and paints tomorrow!

AR-FFFPs have set the standard in terms of minimising the environmental impact of fire fighting foams, an area of growing concern for sprinkler systems.

THE PROPORTIONING CHALLENGE

Having decided on the foam concentrate required, we now need to accurately proportion Niagara into the water supply of the FWSS, which is usually a wet pipe system, unlike most conventional foam systems, which are dry pipe systems. This introduces other potential problems of foam migration that prevent a standard proportioning system from being chosen.

NO ELECTRICS

The need for external power supplies should be avoided since they could easily fail at the start of an emergency leaving the fire protection system inoperable. For this reason the answer lies in an integrated proportioning system using the bladder or bag tank principle which requires only water pressure for effective operation, yet minimal maintenance.

VERY WIDE FLOW RANGE

Conventional foam systems cannot cope with the extra demand of permanently flooded sprinkler systems. FWSS's are permanently charged and the water flow rates vary enormously from very low flows when the first one or two heads discharge, up to the maximum sprinkler head operating scenario when high flows are required. Over this very wide flow range a consistently precise quantity of foam concentrate is required to be proportioned into the FWSS, as a stable and uniform mixture to enable the fire to be controlled.

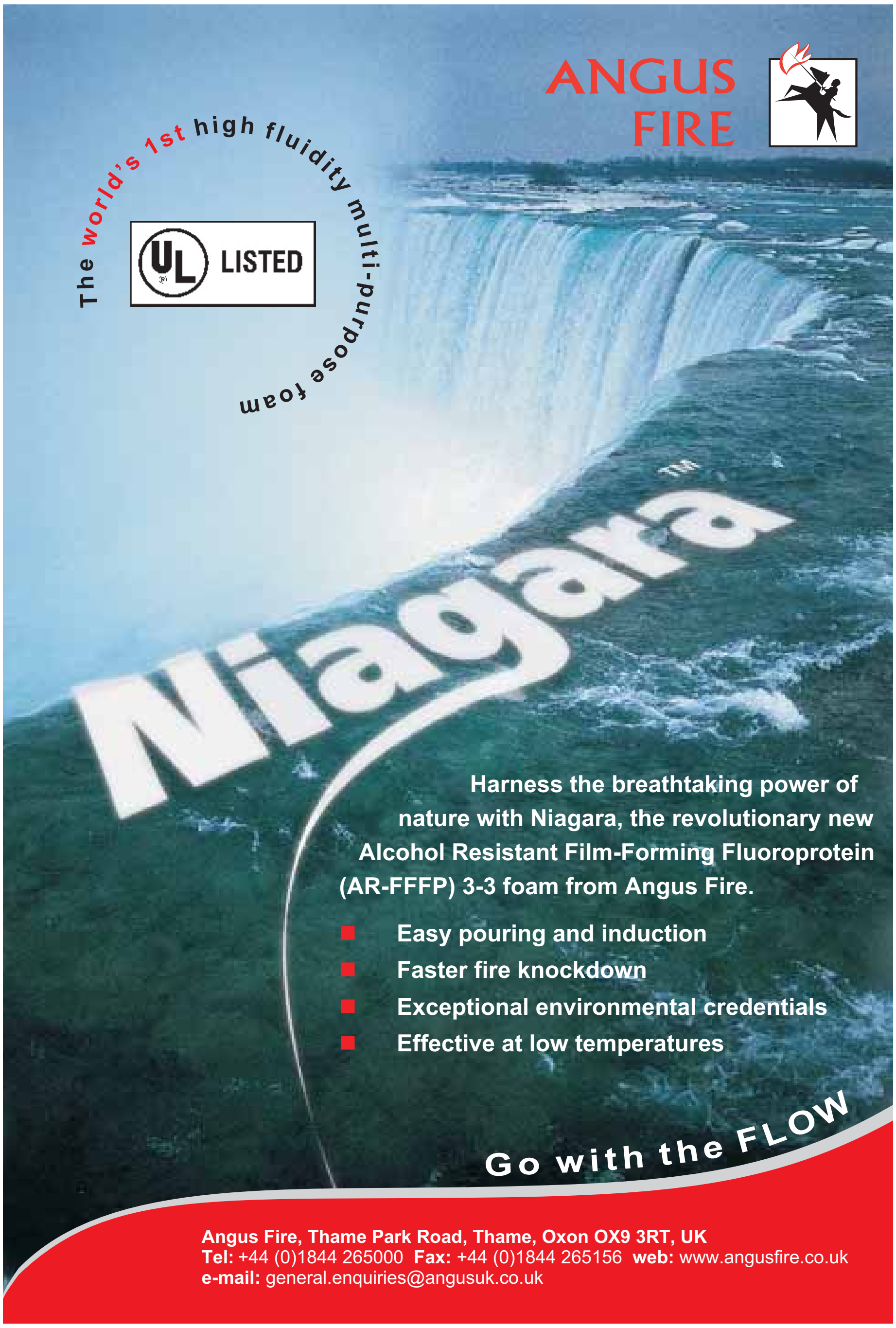
PREVENTING GLOBULARISATION

With any foam system it is important that foam is thoroughly mixed into the water by the proportioner. This can be difficult to achieve with polymer based AR foams as globularisation can occur. This task that can be challenging even with standard Newtonian foam concentrates at low flows, but is especially demanding when shear-thinning polymer based alcohol resistant foams are used. Globularisation or globular drop out is the incomplete mixing of foam and water so that small globules of foam concentrate are suspended within the water stream in the dynamic state, until the flow ceases. In this static state globules then settle out and congeal on the bottom of the pipe. Even when 3% is induced, 3% may not be present in the foam solution! This whole problem area vanishes when Niagara is chosen.

PREVENTING MIGRATION

The FWSS presents a problem conventional proportioning systems never have to endure. Normally, dry pipe system foam valves are only opened when the systems are activated. FWSS are very different. They are normally wet pipe systems with water or premix foam

Picture courtesy of Angus Fire



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solution permanently filling the distribution pipework from the sprinkler heads back past the proportioner to the sprinkler alarm valve. Both foam and water valves are therefore required to be permanently open, exposing a continual risk of foam migration into the water main. Ensuring that foam stocks are not dispersed into the pipework by gravitational effects or siphoning, prior to the system being required to operate, is therefore vital.

FAST RESPONSE REQUIRED

Virtually all fires begin as a spark or small flame that grows with a speed determined by the volatility of the fuel. Rapid detection of the fire in these early stages is critical to achieving rapid control and extinction. Fast response sprinkler heads have been designed to achieve this vital speed, but the proportioning system must also be capable of similarly fast response to provide high quality foam as these first heads operate, to help nip such fires in the bud while still small, minimising damage and associated financial losses.

ACHIEVING INDUCTION ACCURACY

Accurate foam proportioning at these very low flows, as well as accuracy at the high flows, has generated a level of technical difficulty previously unresolved.

SPECIAL PROPORTIONER

Until now, proportioning devices have been limited to providing accurate foam induction in the medium to high flow range when sufficient shearing force makes the foam flow readily. At very low flows (may be less than 200 litre/minute with one or two heads operating); incredibly small flows of foam are required at 3% induction (under 6 litres/minute). At such low foam flows, the risks of no foam being proportioned are relatively high unless a special wide-range and accurate sprinkler proportioner is used.

Comprehensive research, extensive testing and development has shown that a simple reliable answer to this technically very difficult problem is available – but simply purchasing a special proportioner does not solve the problem an integrated solution is necessary to avoid on site calibration problems during installation.

Such factory built and tested wide range integrated proportioning systems represent a major advance in foam proportioning technology, and are being enthusiastically welcomed by the insurance industry, sprinkler installers and regulatory agencies, to comprehensively answer all the difficult questions associated with FWSS applications for trouble-free installation and reliable operation.

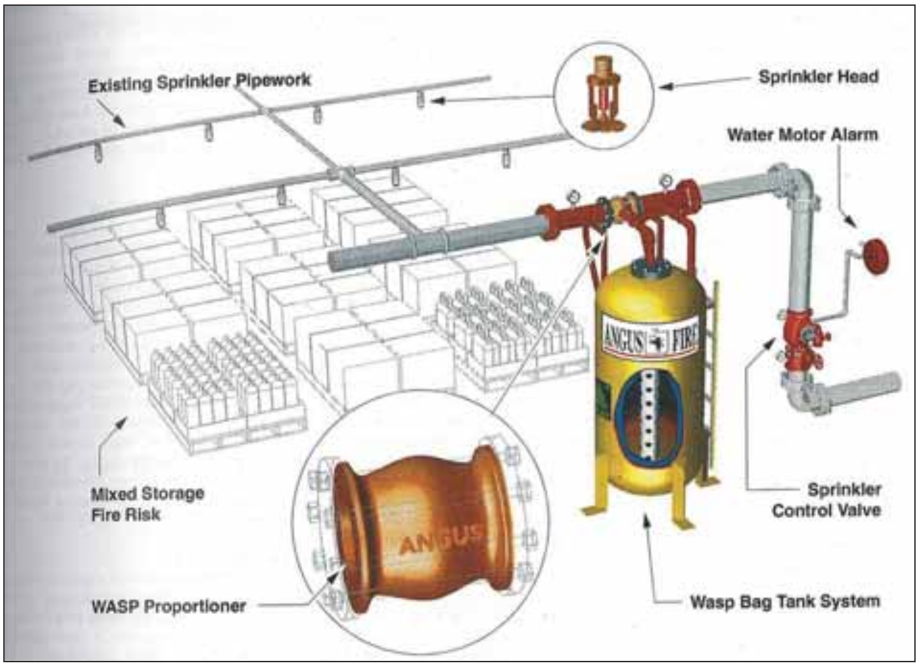
FAST RESPONSE PROPORTIONING

The best of these systems should be entirely powered by the sprinkler system's water supply to avoid the need for any ancillary electrical power source, which could fail in the event of a fire. Consequently operation occurs the instant a sprinkler head operates. As further sprinkler heads discharge increasing the flow, the proportioner should immediately react to increase and control the multi-purpose foam flow maintaining accurate fast response proportioning throughout, rapidly controlling the fire and minimising any resultant damage. Conventional proportioners are unable to operate at such low flows, so crucial time is wasted before proportioning begins. Time when fire can spread, gain a hold and rapidly escalate causing significant financial losses.

Corrosion resistant materials of construction are also an important factor in determining reliable operation where permanent wetting of internal parts could otherwise cause deterioration or stixion. Such careful considerations will permit accurate and dependable operation to be achieved over the lifetime of the system.

TAMPER-PROOF MECHANISMS

Over time, sprinkler systems have evolved simple, yet effective mechanisms



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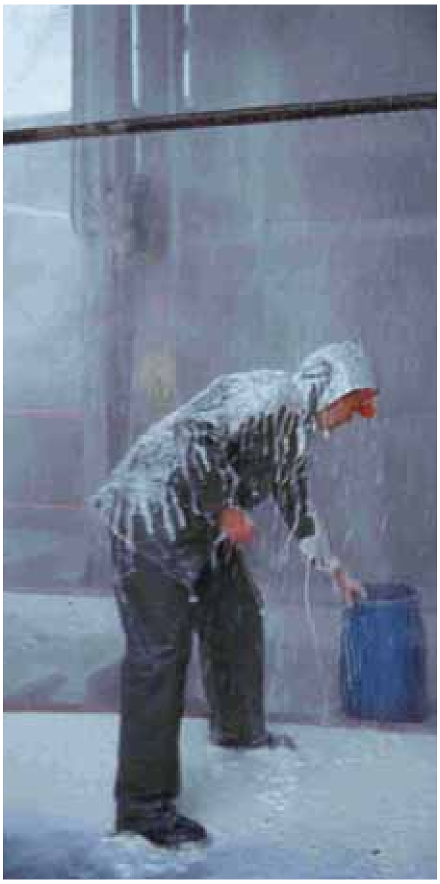


Picture courtesy of Angus Fire

to prevent unauthorised personnel from inadvertently closing or opening valves that could interrupt the fully automatic response of the system upon demand from a fire.

Similar care and thought needs to be given to the foam proportioning systems with valves lockable in the fully open ‘ready to go’ condition for fast response proportioning. Similarly during system maintenance valves can be temporarily locked shut so valves cannot be mysteriously closed after the system is set. Similarly look for removable valve handles on foam fill and water drain lines to prevent unauthorised or malicious draining of the valuable foam or water from the pressurised foam storage vessel which could prevent correct system activation when needed.

TROUBLE-FREE INSTALLATION

Such fully integrated and factory calibrated, pre-engineered systems can save time and potential penalties by providing quick and easy ‘plug-in’ site installation, alleviating problems for the sprinkler installer, operator and insurer alike. System commissioning should always be carried out in accordance with an acceptable international standard like BS 5306 Section 6.1 or NFPA 11 to verify the foam induction is correct and the system is working correctly, once installed.

PERIODIC TESTING

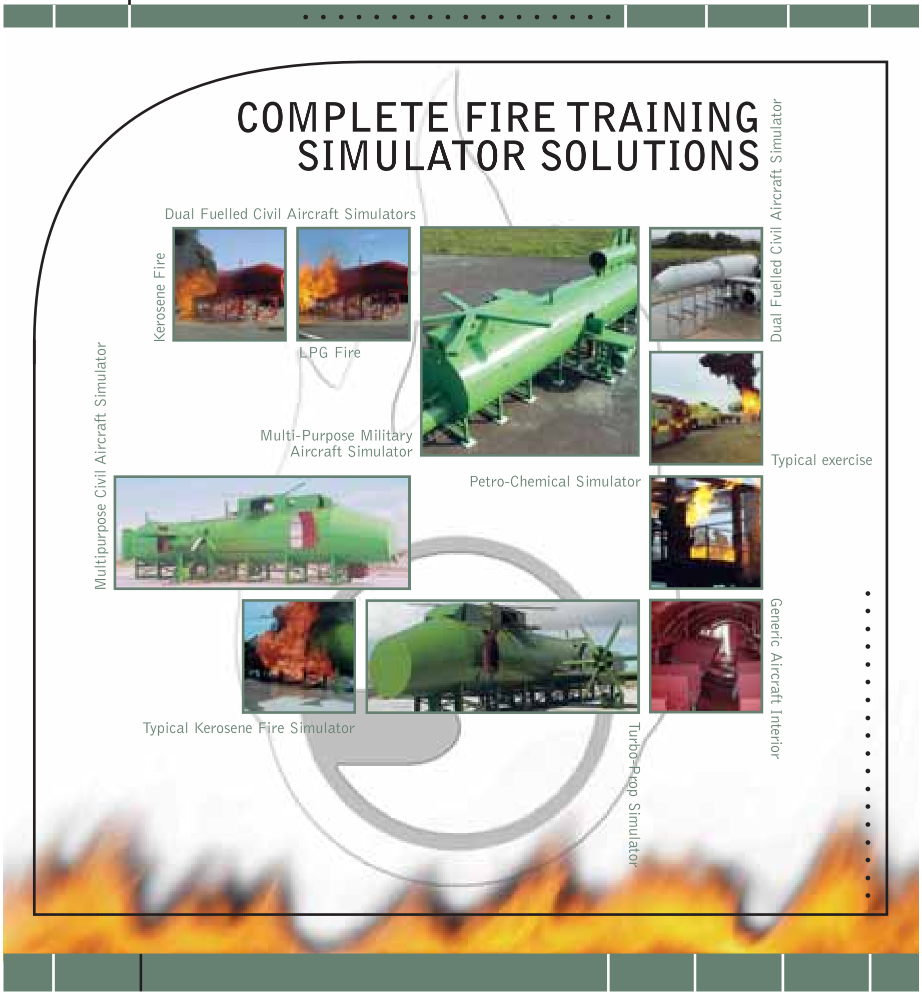
Testing and inspection of alarm and detection devices, sprinkler alarm/control valves, foam concentrates and foam-proportioning systems are all required at least annually under NFPA 16.

The foam proportioning systems should be fitted with two pressure gauges, for simple pressure drop testing to confirm correct proportioner operation. A 50mm (2″) test/drain connection is also useful to allow foam solution samples to be taken for testing. It also allows fitting of one or two test sprinklers, to replicate low flow conditions outside the risk area, or to drain premix foam solution from the FWSS as necessary.

REDUCED FINANCIAL LOSSES

These well-designed and integrated proportioning systems are starting to have a beneficial impact by delivering accurate and reliable performance. Regulatory groups, insurance organisations and operating companies, can now reap the benefits of these technological advances with reduced financial losses in future. The special combination of fast response proportioning coupled with high fluidity multi-purpose environmentally gentle foam delivered from each sprinkler head, is set to save lots of people lots of money if only they act . . .

. . . before fire strikes!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Different Fires Need Different Nozzles

By Mark Saner
Product Manager – Akron Brass Company

Picture courtesy of Akron Brass Company

EVERYBODY KNOWS THAT YOU can't paint a house with a broom. The bristles are too stiff to distribute the paint evenly, and the head is too broad to do any detail work. Sure, you can smear the paint around a little, but it won't do a good job. Different jobs need different tools, and you need the right tool for each job.

The same is true with firefighting nozzles. If you try to make an interior attack on a well-involved structure fire with a low-flow forestry nozzle, the fire will probably push you right back out the door. And if you try to lay down a foam blanket on an open flammable liquid fire with a high-flow smooth bore nozzle, the fire will probably just spread further. Different fires need different nozzles, and you need the right nozzle for each type of fire.

Choosing the right nozzle for a particular type of fire depends on the nozzle characteristics needed to handle that fire. Different nozzles have different characteristics. These include weight, size, ease of operation, nozzle reaction force and foam capability. They also include the reach, penetration, and pattern of the stream produced. By matching the nozzle characteristics to the fire, you can obtain the most effective nozzle for the job.

SMOOTH BORE NOZZLES

Smooth bore nozzles date back over two thousand years and were the only nozzles being used well into the 20th Century. Over the last fifty years, however, many fire brigades have switched to combination fog-straight stream nozzles and have given up the old design entirely. That's too bad because smooth bore nozzles still have a lot of advantages that can't be matched by others.

Probably the biggest advantage of smooth bore nozzles is their superior flowrate, penetration, and reach. When you want to deliver a lot of water with a lot of concentrated energy over a long distance, you want to use a smooth bore nozzle. They are an ideal choice for fires in large open structures, such as warehouses and lumber yards, where high volumes of water need to be applied from a safe distance to protect firefighters from radiant heat and the potential of building collapse.

Picture courtesy of Akron Brass Company

Smooth bore nozzles are also lower cost, easier to operate, and easier to maintain than other designs. And when firefighters are pumping water from natural sources where leaves or debris might be ingested, the risk of plugging smooth bore nozzles is minimal.

In a more modern application, fire brigades that use compressed air foam report that smooth bore nozzles with tips up to 32 mm (1.25-inch) in diameter will produce excellent foam streams with good reach. This is especially valuable in wildland-urban interface fire situations because it allows firefighters to quickly and safely apply a protective coating of foam to the walls and roofs of threatened structures from the ground.

Because smooth bore nozzles produce large reaction forces, especially when using compressed air foam, brigades often specify shut-off valves with pistol-grip handles for better control of handlines. For higher flowrates, fixed monitors offer the stability required to anchor and aim larger smooth bore streams. The use of long, straight playpipes or discharge pipes with internal fins helps reduce turbulence and maximizes the reach of smooth bore nozzles.

Different Fires Need Different Nozzles

Picture courtesy of Akron Brass Company

COMBINATION FOG-STRAIGHT STREAM NOZZLES

Combination fog-straight stream nozzles are the most common type of nozzles used in the fire service today and they include the greatest number of variations in operating performance. Their main advantage is that firefighters can quickly switch from a straight stream to a fog pattern to handle a wide variety of fires.

Single-gallonage nozzles with fixed orifices are low cost and easy to operate, but they don't allow the nozzle operator to control the discharge – if the pressure goes down, so does the flowrate and reach. They are often used with fixed-length, pre-connected handlines where variations in nozzle pressure are small and where the expected fire conditions can be handled by a single flowrate.

Multiple-gallonage nozzles with variable orifices are slightly more expensive and require more training, but they allow the nozzle operator to manually select from several flowrates. They are often used with variable-length handlines where nozzle pressures can vary or where the expected fire conditions may require different flowrates.

Automatic nozzles have variable orifices that constantly adjust the orifice size to maintain a relatively constant nozzle pressure and stream reach under varying flowrates. These nozzles are more expensive, require more training of the pump operator, and do not work well under low nozzle pressures. They are often used with elevated master streams where reaching the seat of the fire is more important than delivering a specific flowrate.

All combination fog-straight stream nozzles are compatible with Class A and B foams, although they do not produce an optimum stream reach with compressed air foam. With Class B foams, they will produce a non-aspirated foam suitable for direct fire suppression. With the addition of foam expansion devices, they can produce low or medium-expansion foam suitable for fire suppression and vapor containment.

When used on handlines, combination nozzles are usually coupled to quarter-turn shut-off valves. They can also be attached to fixed and portable monitors to deliver higher volumes. For example, some brigades use a "blitz line" consisting of a combination nozzle mounted on a portable monitor attached to a 50-meter (150-feet) length of 65 mm (2.5-inch) preconnected hose. In operation, one firefighter can rapidly deploy the monitor wherever it is needed to attack the fire or protect an exposed structure while the other firefighters prepare for an interior attack. The theory is simple: Hit the fire hard and hit it fast. Some brigades have been able to position a blitz line and start flowing 1900 lpm (500 gpm) in less than 15 seconds.

Picture courtesy of Akron Brass Company

COMBINATION FOG-SMOOTH BORE NOZZLES

Combination fog-smooth bore nozzles are relatively new. They are similar to fog-straight stream nozzles except that they use a smooth bore section through the middle of the nozzle to form a solid stream, rather than deflecting the fog stream back onto itself to form a straight stream. The difference is that the smooth bore generates less turbulence and less pressure drop to produce a more solid stream. It's an ideal design for brigades that want a combination nozzle with the maximum horizontal

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and vertical reach of a smooth bore, but also need to quickly switch to fog depending on the fire.

Combination fog-smooth bore nozzles work well with water, Class A and B foams, and compressed air foam. Their ability to discharge long, straight streams of compressed air foam make them attractive to brigades that have added CAFS to their firefighting arsenal, but need the flexibility to also use water streams.

Quarter-turn shut-off valves are needed on handlines equipped with combination fog-smooth bore nozzles, and pistol grips or playpipes are recommended to handle compressed air foam. These nozzles also work well on monitors and other master stream devices in situations where the pump can maintain a sufficiently high flowrate to match the discharge rating of the smooth bore diameter.

FORESTRY NOZZLES

Ask any group of firefighters who have had to pull long hoselays up steep hillsides in order to fight wildland fires, and they'll tell you that the last thing they want are nozzles that are big and heavy. Forestry nozzles are designed to be compact and lightweight, while still being durable enough to withstand the repeated dropping and dragging that are typical of outdoor service in rough terrain.

Picture courtesy of Akron Brass Company

Many forestry nozzles are designed to produce multiple flowrates in the range of 45 to 230 lpm (12 to 60 gpm) to handle different fire conditions. This allows the operator to select the lowest flow required in order to conserve the available water supply. Some nozzles are designed to be used with high-pressure pumps often found on forestry fire apparatus.

Forestry nozzles are compatible with water, as well as Class A, B, and compressed air foams, although their streams don't have as great a reach as smooth bore nozzles when used with compressed air foam.

Picture courtesy of Akron Brass Company

To reduce the overall size and weight, as well as eliminate protruding valve handles that could snag on obstructions, many forestry nozzles have a shut-off valve built into the gallonage selector ring. A simple twist of the ring goes from full shut-off to the first flow setting to allow quick and easy operation in situations where the water flow may have to be turned on and off repeatedly, such as in mop-up operations.

FOAM NOZZLES

Almost any type of handline nozzle can be used to produce very liquid Class A and B foams. With the addition of specially designed clamp-on foam tubes, these same nozzles can also produce air-aspirated foams with expansion ratios ranging from 12:1 up to 50:1 to effectively smother fires and contain flammable vapors with a thicker layer of foam. Flowrates up to 460 lpm (120 gpm) are available.

For higher-volume applications, master stream foam nozzles can produce flowrates of 3800 lpm (1000 gpm) or

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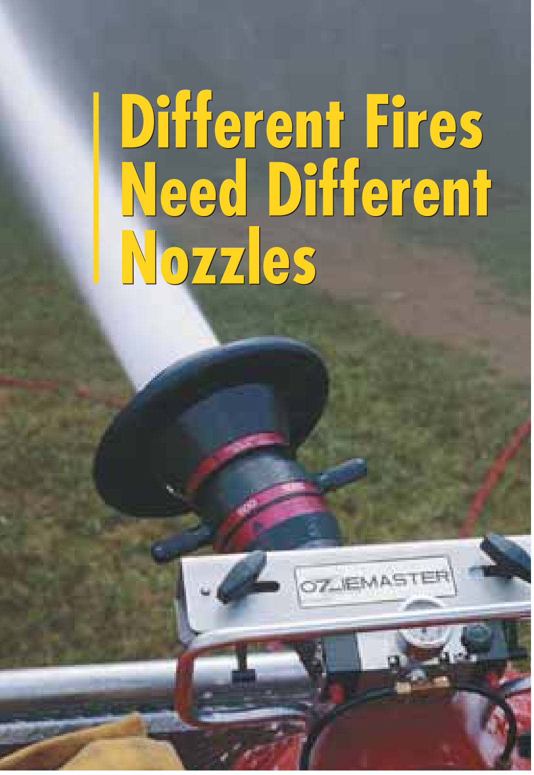

Picture courtesy of Akron Brass Company

more of air-aspirated expanded foam. They can be specified for use with fixed or portable monitors as well as with remote-controlled roof-mounted turrets.

SPECIALTY NOZZLES AND DEVICES

Firefighters should also consider the many specialty nozzles and devices that offer unique solutions for difficult situations.

One of the most valuable specialty nozzles is the piercing applicator. This design features a tubular applicator with a hardened base and tip. Nozzle jets located around the tube just below the tip produce a 360-degree fog pattern. In operation, a firefighter uses a sledgehammer to drive the tip of the applicator through plaster, wood, sheet metal, or even concrete blocks to reach fires in attics, crawl spaces, or otherwise inaccessible spots. Flowrates up to 475 lpm (125 gpm) are typical.

When firefighters need to hit inaccessible fires with larger flowrates, rotating cellar nozzles can provided 950 lpm (250 gpm) or more in full circle pattern. They can be lowered through an opening to reach fires in cellars, attics, or other areas where access is restricted.

In some cases, fire conditions are potentially so dangerous that you don't want to assign personnel to operate the nozzle. In those cases, a nozzle mounted on an oscillating monitor will automatically sweep side to side or up and down with flowrates up to 1420 lpm (375 gpm). They are ideal for use in high radiant heat areas or where a building collapse may occur.

Picture courtesy of Akron Brass Company

MATCH YOUR NOZZLES TO THE FIRE

To obtain the most effective tools to handle different fires, fire brigades should consider the types of fire they might encounter and then match their nozzles to the fire. There are lots of choices, and you should select the ones that will do the best job for you.

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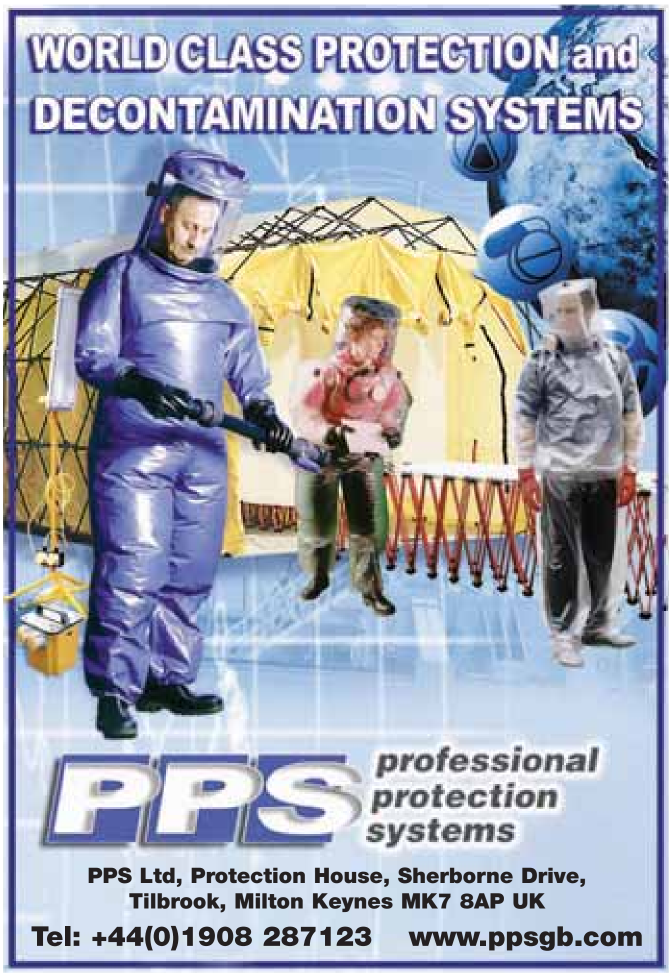
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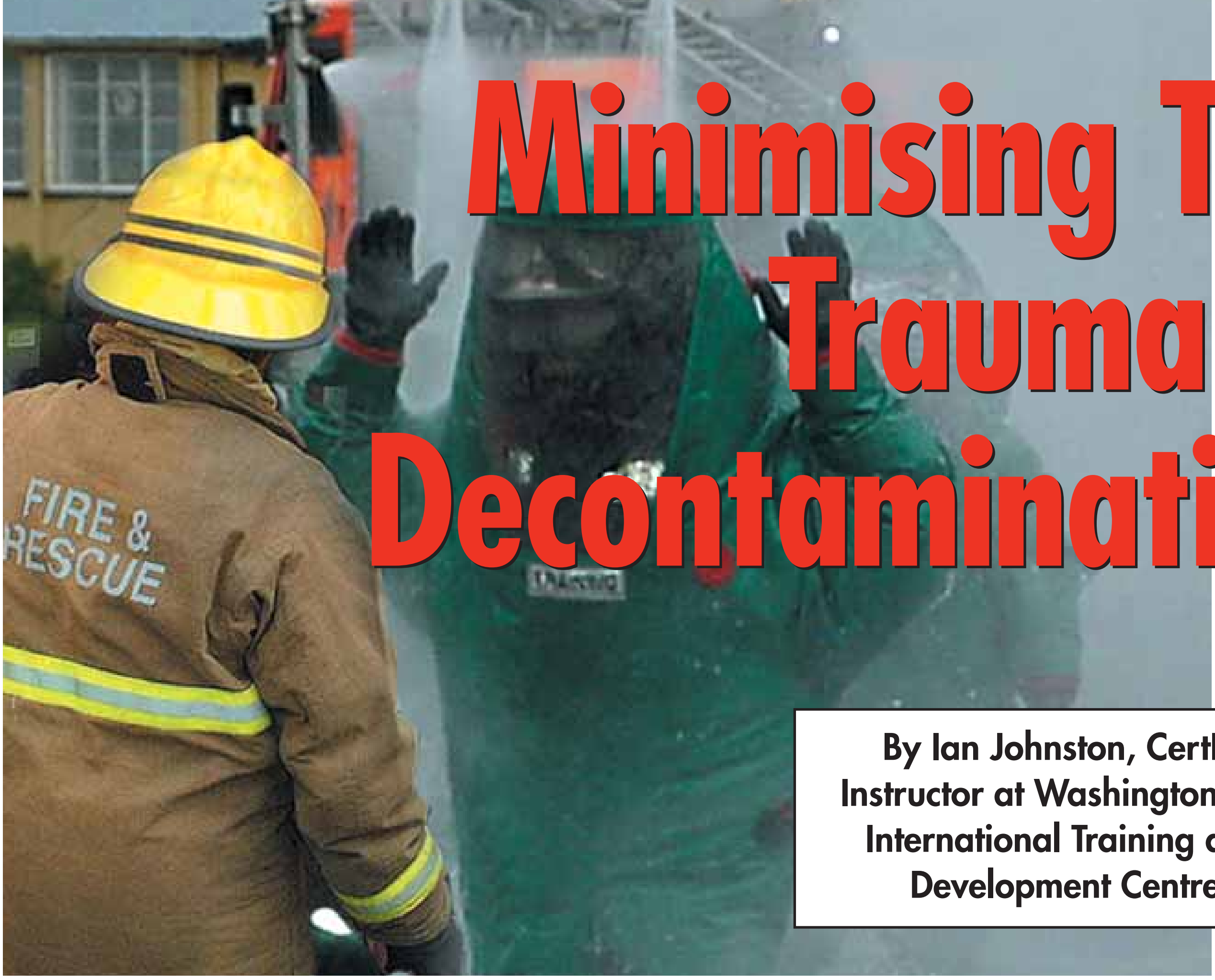


Minimising The Trauma of Decontamination

By Ian Johnston, CertEd
Instructor at Washington Hall International Training and Development Centre

Picture courtesy of Washington Hall International Training and Development Centre

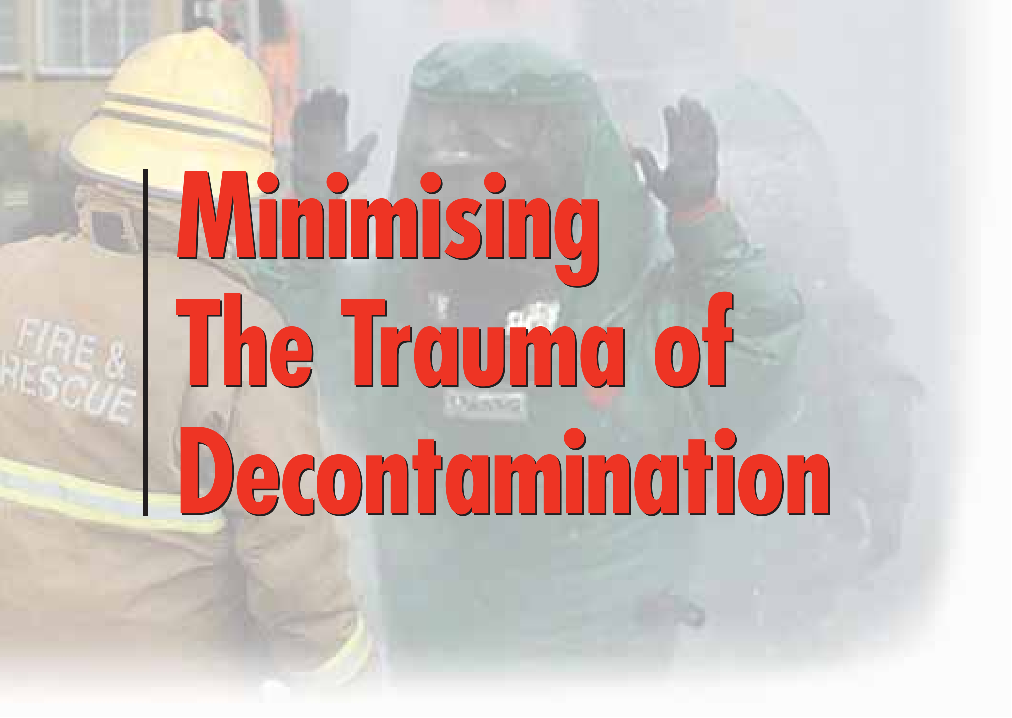
DECONTAMINATION PROCEDURES HAVE BEEN developed from systems that were initially designed for those who work in or around hazardous substances and those emergency workers who are called to resolve incidents. The need to decontaminate large numbers of people who have been exposed to hazardous substances had not until recently been adequately provided for. The events of September 11th in New York prompted a UK Government Minster to coin the term 'a new dimension' in relation to terrorist incidents and the targeting of large numbers of people gathered in one place. The events of September 11th prompted governments to look at their 'national resilience' plans, with part of that review looking at the facilities that could be provided to adequately care for those who may have become contaminated by a hazardous or dangerous substance.

The insistence of mankind to gather in ever increasing numbers, to travel at higher speeds and to produce/transport ever more dangerous chemicals and substances has become a fact of modern life. This is even more a threat to society when war or terrorist activities focus on involving chemical, biological or nuclear material as part of the available weaponry. But this is not the only problem posed by an incident. The possibility of traumatic injury through direct violence has to be considered as part of the victim's treatment.

Contamination could occur through the simple release of chemicals through a failure of procedure or plant or a combination of a release and injury through fire, blast or structural collapse etc.

The primary objective of decontamination is to prevent secondary contamination or spread of the contaminant to other people or places. In order to affect this, a hierarchy of control measures will need to be introduced. Firstly the area should be secured, thus preventing unauthorised people entering or leaving the contaminated area.

> *Contamination could occur through the simple release of chemicals through a failure of procedure or plant or a combination of a release and injury through fire, blast or structural collapse etc.*



Minimising The Trauma of Decontamination

Then an appropriate decontamination procedure should be instigated. This procedure should ensure that any and all significant contaminants are removed from the victim and that they can leave the immediate area without risk of being re-contaminated. No people or substances should be allowed to leave the area without being under effective control. Finally the scene will be deemed 'clean' and restored to normal function. Through all of this the authorities must balance the needs of the wider society in terms of the possibility of secondary contamination, against the direct impact in terms of medical, psychological and social needs on the individuals affected.

The aim of all emergency services should be to contribute to a continuum of care that focuses on providing the correct treatment during their period of contact that will compliment the work of those who will continue the care after the initial emergency phase. This approach will ensure that the victim is given the best possible conditions for making the appropriate recovery available to them.

The concept of triage is well understood by the emergency services where the aim is to do the most good for the most. Sometimes it will be hard to accept the stark reality that there simply aren't sufficient resources either available at the scene or that can be mobilised in the appropriate time to deliver the necessary care to all those that require it. This is an absolute constraint and its existence should be understood by all those who intend to attend such incidents, otherwise they too will become victims of the event.

With any incident, large or small, there will be a range of 'needs' presented by those involved. The victims may be aware of obvious threats to themselves such as fire or the collapse of a building or structure. There may also be unforeseen threats such as the continued exposure to a toxic substance or the presence of a secondary explosive device. The obvious needs will vary from person to person but each victim will place their own weight of importance on what they require and what there own, individual priorities are.

> *The aim of all emergency services should be to contribute to a continuum of care that focuses on providing the correct treatment during their period of contact that will compliment the work of those who will continue the care after the initial emergency phase.*

There will be those that require immediate life saving intervention, where an individual needs assistance to maintain basic functions such as opening their airway, support with breathing or the control of major haemorrhage. Others may require access to life saving medicines, diabetics will require insulin or asthmatics may require inhalers. Cultural or religious beliefs will require the victim to maintain a certain degree of modesty and prevent the removal of clothing in the view of others, despite the risk to the individual in not doing so. The prevailing weather conditions may not present an immediate threat but if it is going to take many hours to decontaminate large numbers of exposed victims (and it will) then the effects of rain and cold weather will result in them becoming hypothermic, whilst conversely those not able to shade from long exposure to the sun will suffer from the effects of excessive heat. There may be those who have become separated from friends or relatives or may have become deeply, psychologically traumatised by the events that they have witnessed. If children are involved then the situation will be more acute. The ability for them to be able to cope with the situation and the process involved may not be well understood. This may also prove difficult for the rescuers to cope with.

As already mentioned the emergency services should be in a position to carry out some system of triage. This system may have to be significantly different from one that would be operated at an incident not requiring decontamination.

Victims in direct contact with contaminants are said to be in the 'Hot Zone'. This area presents the highest threat from the effects of the contaminant and those present will continue to be affected unless they are removed from the contaminant, the contaminant is removed from them or they are appropriately protected from the substance. Those still contaminated but not in direct contact with the contaminant and are awaiting decontamination are deemed to be in the 'Warm Zone'. Those carrying out triage in the 'Hot Zone' will have to wear protective clothing and positive pressure compressed air breathing apparatus (BA). The policy in the UK is to wear a gas tight suit and BA, the thinking being that in the first instance the contaminant may be unknown so the highest level of protection is afforded to the rescuer until the exact nature of the substance is known.

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The dilemma now is that only a limited number of people capable of operating a triage system whilst wearing the appropriate personal protective equipment can operate in the 'Hot Zone'. This is due to the logistical support required to provide, maintain and decontaminate triage operators.

Normal triage would prioritise victims into four time frames for receiving care, priorities one to four, with one being the highest and therefore the first. The victims are then directed to appropriate care centres or the care is brought to them. In the case where decontamination is required it may not be possible to bring the care to the victim due to the necessity to provide sufficient numbers of trained personnel, PPE and adequate decontamination facilities for the carers. Additionally some victims may present as priority one, but due to the nature of the contamination they must be decontaminated before being removed from the area to obtain care. This will add significant delay in them receiving care and it may not prove unrealistic that they can be decontaminated in the time required before they can receive definitive care.

To better care for victims, a system that differentiates between those that are simply contaminated and those that are injured and contaminated should be considered, and can be considered as physical and clinical decontamination respectively. Physical systems provide for the victims to change clothing, bag contaminated items, shower in warm clean water and re-robe in new clothes before being deemed 'decontaminated'. In addition, facilities capable of moving non-ambulant victims not requiring immediate medical care are available with units capable of allowing 200 people per hour to pass through.

Clinical decontamination is labour intensive and would usually use medically trained operators who wear PPE appropriate for the 'Warm Zone'. Their task is to care medically for the victim whilst de-robing them and removing all trace of contaminants. Once completed the victim can be transferred to the appropriate medical facility for ongoing treatment.

It should therefore come as no surprise that a significant amount of resources are required to adequately cope with decontaminating large numbers of victims. The threat to society through secondary contamination will only lead to greater losses. Public education stating the reasons why decontamination is necessary will lead to better understanding. If and when people are involved in this process, their understanding and acceptance of the procedures will allow the authorities to maintain better control. This will allow the objective of doing the most for the most to be achieved.

> *To better care for victims, a system that differentiates between those that are simply contaminated and those that are injured and contaminated should be considered, and can be considered as physical and clinical decontamination respectively.*

Ian Johnston CertEd is an Instructor at Washington Hall International Training and Development Centre. In addition to his 27 years fire fighting (8 as a trainer) he is the co-author of Systematic Trauma and Rescue Training Course at Lancashire Fire and Rescue Service's Training Centre. Responsible for trauma training at the Centre, he is an experienced Incident Response Unit Mass Casualty Decontamination Trainer and Emergency Medical Technician. Ian can be reached at ianjohnston@lancsfirerescue.org.uk

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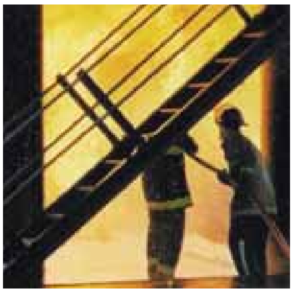

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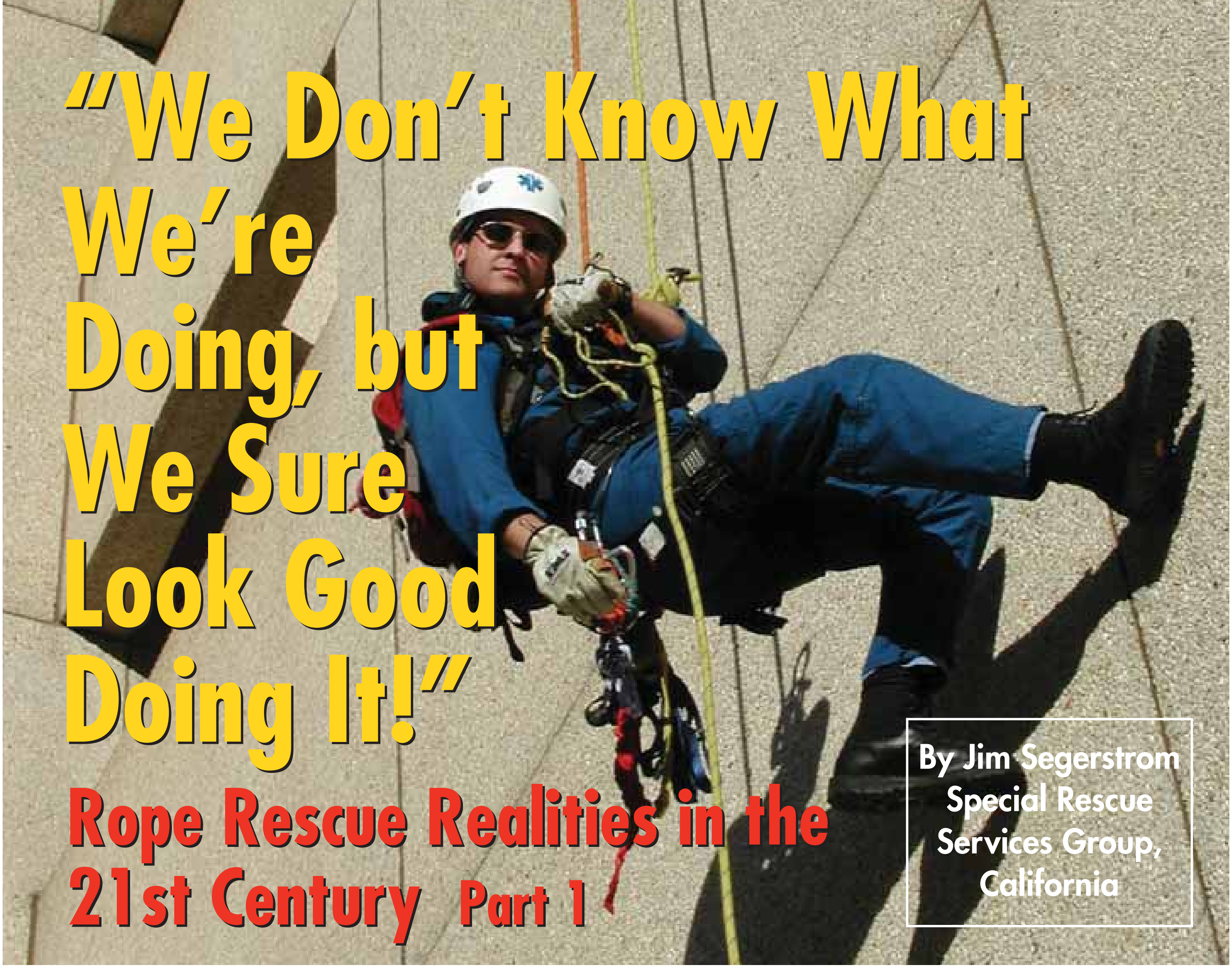
“We Don’t Know What We’re Doing, but We Sure Look Good Doing It!”

Rope Rescue Realities in the 21st Century Part 1

By Jim Segerstrom
Special Rescue Services Group, California



Picture courtesy of Jim Segerstrom

OF ALL THE RESCUE “DISCIPLINES” rope rescue is perhaps the most mystifying. Globally there are on-line discussion groups dedicated entirely to rope rescue. In the United States each year the International Technical Rescue Symposium provides a forum for devotees, for whom the slightest nuances and changes provide the basis for endless argument and discussion. Workplace safety authorities in several countries, most notoriously in the European Union, convinced that industrial workers, firefighters and other rescuers are just on the edge of incompetent, have legislated “safety standards” for rope work to the point that such rescues have become mired in issues of legal compliance instead of performance!

Asian firefighters and rescuers, oriented to trying to achieve similar standards, have also found themselves involved in extremely sophisticated rope rescue training programs, requiring extensive initial training regimes, regular and rigorous in-service practice and substantial investments in equipment in order to maintain competent performance of these increasingly sophisticated skills sets.

Our instructors have been involved in providing rope rescue training to personnel from Japan, Taiwan, China, and Malaysia. Universally, their supervisors are insistent that students get “US-style rope rescue training.”

After all, if we’re wearing helmets manufactured in New Zealand, full body harnesses from California, and are festooned with carabiners, pulleys, ascenders, and other paraphernalia from Europe, the US and Australia – even though our skills sets are sadly lacking and it may take hours to perform the rescue – at least we look good doing it.

The realities of rope rescue are quite different however.

The Challenges:

1. The “Fire Department” has become the “Fire Rescue Department.” Simply painting the word on a fire engine or embroidering it on a shirt, however, doesn’t make it a fact. The drive to meet the public’s expectation of increasing services has become an overwhelming one, fast outstripping most organizations’ abilities to perform such tasks. When I first became a rescue paramedic 25 years ago, it was unusual to see a fire engine at a medical or rescue call. Now it is the norm. 20 years ago “rescue” to the fire service meant auto extrication. Search and rescue was largely a law enforcement function, and remains so in many jurisdictions, particularly in the western US and throughout Asia. Now the fire service finds itself responding to an ever-increasing variety of calls including not only rope, but also hazardous materials, confined space, trench, helicopter collapse, and water. Each of these distinct disciplines requires major commitments in time, money, and personnel. As the result, the fire service finds itself frequently over-committed, over-extended, and under-prepared.

2. In the United States 7 out of 8 firefighters are volunteers. Training requirements and standards are constantly increasing, putting more strain on the system. The situation is similar in many Asian countries. Worse, there are Asian countries who either do not have volunteer systems, or in which volunteers are woefully under trained and equipped, further endangering both themselves and those they are attempting to serve.

The volunteer fire fighter system in the US is under increasing pressure as fire training standards increase and the number of tasks continue to multiply; and also due to pressure by the highly powerful professional firefighters’ unions.

3. Surveys routinely show that Americans implicitly trust the fire service – paid

Picture courtesy of Jim Segerstrom

and volunteer – far more than any other government entity. Firefighters have returned that trust by routinely putting themselves in harm's way, generally due to lack of training and equipment suitable for the increasing tasks they are assuming.

4. Paid fire departments are under equal strain. The vast majority of paid fire departments in the US expend at or near 90% of their annual budgets on salaries, benefits and retirement packages. Of the remain 10%, nearly 7% is spent on fire suppression – a job that major fire departments now due less than 7% of the time. So, less than 3% of the budget is left to devote to the myriad other tasks that the fire service has taken on – sometimes when a new mission is identified, but frequently for budget justification – which fill 93% of the time!

5. Rope rescue is, literally, the "thread" that runs through all rescue disciplines. There is a rope component in each. In the US this relationship is so distinct that NFPA 1006 strongly suggests that ANY kind of rescue technician MUST be a rope rescue technician first.

6. Fire suppression is an exact science, based on over 150 years of intense research and proven methodologies. Search and rescue isn't. It is a largely theoretical body of information based on anecdotal information and frequently flawed testing. In short, it is not even an art. It is black magic. The science involved is less than 20 years and still in its formulative stages. The "magicians" are those with the most practical experience, who have retained the "tricks" the best. Training therefore becomes problematical. Fire instructors trying to use traditional methods to teach rope rescue discover that "muscle memory," that is, repeatedly performing skills to increasing retention, simply don't work with rope rescue. Indeed the half-life of thorough rope rescue training is less than six months without frequent and intensive in-service following. Rope rescue skills retention is an abstract combination of training, practice, teaching others, and experience.

7. The technology is accelerating. 30 years ago rope rescue meant a piece of manila rope and a pompier belt. Now it means hundreds of new techniques and pieces of equipment each year. Staying up with the technology is possible for only a few, either devotees or those tasked with such work.

8. Many services don't "play" well with others. This problem is endemic to public safety, and occurs everywhere, not just in Asia. As the result, service to the public suffers, and appropriately trained agencies are under-utilized due to political "empire building."

Recently, in a country that will go unnamed, a fire service responded to a call for a 70 year old man who had fallen some 40 feet down an abandoned well. Even though there was an equipped and appropriately trained technical rescue unit immediately available for dispatch, firefighters chose to use their new "rope rescue packs," to effect the rescue, ignoring the rival organization. Since there were not enough "Industrial Approved and Certified" harnesses in the pack, and since personnel were prohibited by law from using "hasty" harnesses, the firefighters had to lower and raise rescuers and paramedics who then had to change in and out of gear. The victim was initially conscious and, as a retired physician, was actually able to tell paramedics his own signs and symptoms. However, due to the lack of training and equipment, and the efforts to comply with regulations, the rescue, which should have taken 20 minutes, took over an hour. The victim was finally pulled from the well, dead.

9. Rope rescues are infrequent events. Typically agencies will devote the majority of rope rescue training to situations involving vertical rescues, calls that occur only rarely. The suggested evolutions for such calls are generally complex, requiring multiple ropes and anchors and specific skills assignments. When the call finally happens, safety dictates that personnel must simply take more time in order to determine that they are proceeding safely. The majority of calls are simpler, involving short vertical distances in confined spaces, or gradual slopes. Effectively, training should concentrate on the majority of applications, rather than the very occasional occurring vertical rescue calls, but doesn't.

10. While there are a few who are fascinated with everything having to do with rope rescue, most students find the subject tedious and boring. Even though their very lives may depend on the information, it is generally presented in large segments, making retention difficult. Since there is no time or budget to build retention through practice, skills drop away quickly over a short time. Thus the appearance of various "crib" cards on lines attached to gear bags; small flip chart books, and plastic diagrams on the inside of container boxes of rescue gear.

11. The fire service's love of the "train the trainer" concept is not conducive to specialized rescue training. In an effort to "save money" fire services in many countries have developed the predatory practice of simply "adopting" proven training programs – mostly developed in the private sector – and then creating a "train the trainer" regime. Like third generation videotape, however, the delivery becomes progressively blurred through the process, and there is virtually no guarantee that each generation of "trainer" is any more competent than the students they are teaching. While there are many competent instructors in the fire service, there are not a few unqualified ones as well. As the result, the agency ends of with large numbers of inadequately instructed rescuers, rather than a small number of proficient ones.

12. When the fire service does outsource training, the tendency is to seek out other firefighters who have gone into the private sector, as if the very experience of being a firefighter somehow imparts all wisdom. Many of the best of the rope rescue delivery systems now used in the fire service were initially developed either in the industrial or mountain rescue environments, and make the best transitions to the fire ground. Those contracting for such services are best served by closely

Picture courtesy of Jim Segerstrom

looking at both CVs and client lists, and then asking for an extensive reference list, before making such financial decisions.

Some Potential Solutions:

1. Rescue experts and educators now generally agree that competency in the fire-rescue service should be generally divided into three levels: awareness, operations, and technician. The International Rescue Instructors Association furthers this division with three additional levels: instructor; specialist and management.

The agency will get the optimum result when those in charge determine exactly what their true service needs are and train to that level. If, for instance, rope rescues occur only rarely, the agency should assure that basic safety training regarding ropes, ("awareness,") is provided to ALL personnel, that combat firefighters who will support such operations, and may indeed be able to effect "low-tech" rescues receive "operations" training, and then that a small group be trained to the "technician" level, all in order to fill the roles of "safety" and "operations" at rope rescue calls, as well as acting as technical specialists for the Planning Chief at larger incidents.

2. As in all aspects of rescue, the agency should pre-plan rope rescue responses in the first due area. *An example:* A few years ago I was hired to provide some additional rope rescue training for an agency that was confronted by repeat calls at a cliff area where cars routinely plunged nearly 500 feet to the base. The challenge, they said, was practicing enough at knot passing on both lowering and raising systems, to accommodate their standard rope cache of 200 and 300-foot long ropes.

I suggested that they buy a couple of 500-foot ropes.

Equipment and training need to match the needs first, rather than industrial "model" provided by many rope rescue-training syllabi.

3. Consider outsourcing initial training from professional organizations with deserved reputations for excellence, which can also provide structure for creating in-house instructors. Make sure in-house instructors have enthusiasm for the subject and exhibit the best attributes of concerned educators – well organized, good listeners, and constructive critics who have the respect of their peers.

4. At all costs, avoid dogma, both in instruction and delivery. Remember, rope rescue is part fact and larger part sorcery. There are as many opinions as there are programs, and they all profess to be the "right and only way."

An example: At a recent rescue conference we created a competition which required teams to use a set pile of equipment to lower a rescuer on a vertical face of a building, rescue a victim and then continue to lower rescuer and victim to the ground as a timed event. The team with the longest time was eliminated, we took a set number of items out of the caches of the remaining teams and repeated the evolution, again eliminating the longest time and taking more gear out of the cache. At the third evolution two of the remaining teams reported they couldn't continue because they didn't have enough gear to conduct a "standard rescue" evolution.

Picture courtesy of Jim Segerstrom

In fact, they did, and knew it, but were afraid that using their skills and knowledge instead of standard operating procedures would put them at hazard.

The winner of the competition was a mountain rescue team, who finally conducted the rescue using one rope and a minimum of gear – the same way that mountaineers have been affecting such rescues for the last 100 years.

5. Keep it simple. Most rope rescues, as mentioned, involve short distances and low angles. The skills necessary to perform such operations are basic and easily retained.

6. Using the Incident Command System effectively will eliminate many rope rescue problems. The Incident Commander may only have "awareness" training in rope rescue, but since that should include such subjects as specific hazard assessment, scene size-up, and risk vs. benefit decision-making, the IC will realize that the first assignments should be for a proficient Safety Officer and an Operations Chief. The most competent rope rescuers on the scene MUST fill these two roles. The Safety Officer will vet the "systems" built by the Operations Chief before anyone is sent over an edge on a rescue. Granted, using the two most talented rescuers in these roles will likely slow the rescue.

7. Ropes don't break. The concentration of rescuers does, due to rising tensions, emotion and urgency. Speed is tied to proficiency; hurrying is tied to mistakes.

8. Rope rescue problems occur for four primary reasons:

- Failure of anchors;
- Failure to protect any sharp edges;
- Human error; and
- Failure to implement a Safety position on every call.

Anchors are the first aspect of rigging and the most critical. Sharp edges cut into ropes, causing potential failures. Both are generally the result of human error, driven principally by a combination of, as mentioned, a rising sense of urgency as well as a lack of skills. So, making sure that there is a designated "Safety," and that nobody goes until Safety checks the system, will clear the majority of problems before they occur.

9. Finally, and perhaps most critically: practice, practice, and more practice.

Fire agencies all over the world, as noted, are increasingly trying to deal with more and more threats, and thus, more and more "jobs." If the recognized "half-life" of rope rescue skills is six months, then training every six months is the minimum requirement. Station officers should pull the gear out more frequently to review knots, hitches and gear.

A new and effective tool to meet the needs of rescue agencies is Rescue Rigger©. This computer program not only allows the subscriber to build any imaginable rope rescue system, but will also rate loads and determine mechanical advantage. Training officers are now using Rescue Rigger to create training tests, PowerPoint training aids and realistic and practical testing – all conducted on a desk top or laptop computer! Students build anchors, put knots in the ropes, hook the ropes to pulleys, harnessed rescuers, litters, trees, boats and fire engines and "make" the rescue, all without leaving their chair at the fire station! Rescue Rigger is constantly being updated and improved, and downloads are free and automatic. For further information, simply go to www.specialrescue.com and hit the "Rescue Rigger" button.

Now that we have covered the theory it is time to address the practice of rope rescue. In Part 2 of this series we will explore the equipment used, and cover the basic rope rescue skills that will cover most emergency agencies in the most common rope rescue situations around the globe.

Ergonomic trials – selection of climbing, crawling and stretching
Picture courtesy of Bristol Uniforms Ltd.

Fire Fighte

National and Internation

By Richard Storey, RSL Associates

TODAY'S UK STANDARDS FOR fire fighters' clothing find their origins in the first Home Office A1 specification dating back to 1965. Further modifications and product development work were undertaken following the Pointsman disaster in 1984 and the King Cross Underground fire in 1987, which fundamentally changed the way garments were designed. Working closely with London Fire Brigade, the Classic Fire Coat and Trouser was designed and became the basis of the new Home Office Specification A26, which remains the basis of industry standards up to the present day.

European and International performance standards for fire protective clothing, all part of what is today know as fire service PPE (Personal Protective Equipment), have, in the main been developed over the last 10 years although individual nations have had their own standards for much longer – as in the case of the UK and USA.

Although European, North American and International standards all vary from one another they are all based around the performance of three key components – the outer material, the moisture barrier and the thermal barrier as well as their performance in composite or component assembly.

The current performance standard for structural fire fighting within Europe is EN 469, first published in 1995, for "Protective clothing for firefighters". This tough and searching standard measures garments for resistance to radiant and convective heat to assess their thermal insulation qualities. Testing is carried out using clothed life-size mannequins with a glass-epoxy "skin" with implanted sensors capable of recording temperatures when exposed to intense radiant and convective heat simulating flash-fire conditions. Approved testing laboratories include Du Pont's THERMO-MAN® in Geneva, Switzerland and BTTG's RALPH in Manchester, UK.

Although EN 469 is the primary standard relating to fire fighter clothing, a number of others combine to form a series of standards aimed at providing a comprehensive level of protection for firefighters. These include EN 1486 "Specialised clothing for specialised fire fighting", EN 531 and EN 531/A1 "Protective clothing for workers exposed to heat" and EN ISO 15384 "Protective clothing for wildland fire fighting"

Internationally, the two key standards in this field are ISO 11613 for protective clothing and ISO 15538 for proximity clothing. Specifically, fire fighter clothing would be expected to meet ISO 11613 Parts A & B, the latter requiring a greater resistance of all fabric layers to heat and thermal shrinkage and cleaning shrinkage as well as a measured level of char resistance. The latter standard also calls for tear resistance for the moisture and thermal barrier layers and a thermal protective performance (TPP) of the component assembly.

In North America, different standards apply and are set by the respective governing bodies in the USA and Canada. The National Fire Protection Association (NFPA) in the USA has enshrined its requirements in NFPA 1971 (2000) whilst in Canada the equivalent is the Canadian General Standards Board with its CGSB 155 (1998). Both of these standards are not only similar to one another in technical performance requirements, but are also closely aligned to ISO 11613: Part B.

Given the current trends to greater international harmonisation on many fronts, it is not surprising that greater co-operation between the different standards bodies is already evident and this is expected to continue, in particular, as revisions are considered by CEN and ISO standards committees.

Performance standards for fire fighter clothing are determined by constantly reviewing the behaviour of garments in real-life fire situations and the capabilities of the materials technologists to develop and produce ever more performance-enhanced fabrics to meet changing needs and provide ever greater operator safety. It is the design skills of the garment manufacturers in combining the individual layers into composites, which ultimately results in the market availability of firefighters clothing, which is both highly protective and comfortable for the wearer.

Generally accepted as one of the most physically demanding of all civilian occupations, fire fighting has been extensively researched in respect of the physical protection afforded by personal protective equipment (PPE) against various forms of hazard exposure but has not, until recently, received the same level of attention in terms of the impact and effect on the fire fighter or the clothing itself.

Wearer heat-stress has now become an issue of considerable concern not only in European climates but, more particularly, in warmer and more humid climates as experienced frequently in Asia and Pacific Rim countries. The emphasis has turned to developing lighter-weight garments, which place less strain and reduced internal heat build-up on the wearer during prolonged use whilst, at the same time, not compromising the performance integrity of the clothing.

"Concerns raised about the health and wellbeing of fire fighters wearing fire coats and trousers made from layers of

Thermo Man (Du Pont test rig in Geneva)
Picture courtesy of Bristol Uniforms Ltd.

rs' Clothing

al Performance Standards

fabric designed to protect principally against flames, heat and water for lengthy periods of active duty have led to much debate recently about heat stress and its impact on the operational effectiveness of fire fighters", comments Ian Mitchell, Joint MD at Bristol Uniforms Ltd. "We have made a conscious decision to channel part of our research budget into this important area because without PPE suppliers committing time and resource to such issues, development and innovation of next generation PPE will simply not happen!!!".

Human Vertex Ltd, a recognized leader in the conduct of complex human trials, who were asked to set up and carry out a programme of physiological tests during late 2003, refer to this subject as the 'detrimental effect on fire fighters thermoregulatory system'. The weeklong trials conducted at the University of Birmingham, UK, were designed to inform the debate and to become the first extensive study of its kind undertaken by a PPE manufacturer in Europe to focus specifically on this important issue.

The trials used a modified version of the provisional European Norm prEN 469:2002 Annexes D & E. The modifications became necessary when the exercise intensity proposed in the standard was found to be incompatible with current accepted limits adopted by UK fire services.

Six operationally active fire fighters were initially subjected to a series of baseline assessments in a thermo-neutral laboratory before undergoing 10 separate treadmill exercises in an environmentally controlled laboratory over a 4 day period. All the volunteers were deemed fit for the study by their Occupational Health Advisor.

The study was conducted on a double-blind basis. Neither volunteers nor testers were given details of the fire clothing being tested. Assessments carried out included an analysis of objective and subjective data. Objective data included core and skin temperature, heart rate and total body weight loss. The subjective evaluation included ratings of comfort and exertion. Ergonomic assessment was also obtained using an ergonomic drill, which included walking, crawling, stair climbing and reaching exercises conducted over a period of around 6 minutes.

Individual experiences were recorded in questionnaires on comfort, fit, ease of donning and doffing and overall ease of movement. These responses were collected both before and after the exercise drills, the treadmill tests and after doffing the different types of ensemble.

Throughout the trials, 10 fire-kit assemblies were used, which were a mixture of existing and new material combinations and designs. All, however, fully conformed to the material, design and construction requirements of the provisional European Standard prEN 469:2002

Whilst the physiological tests indicated no significant differences between the different ensembles tested, primarily due to the large inter-individual differences in the measures, there were some highly significant differences in the subjective analysis, which clearly allowed the ensembles to be ranked form 'worst' to 'best'. Sufficient consistency prevailed to allow the best 3 and worst 3 ensembles to be clearly identified.

A number of important issues arise from the findings of these trials. Human Vertex Ltd have offered a number of suggestions and some of these are summarised below to help inform and stimulate discussion as to the conduct of future effective and realistic trials and the devising of appropriate standards for the measurement of the effectiveness of fire fighter PPE.

"The questionnaire data obtained during this study indicates that the volunteers were able to differentiate between ensembles in terms of comfort, thermal strain and freedom of movement. However, the two ratings scales that were used during the modified exertion and comfort tests proved to be too insensitive for significant results to be generated. We would therefore recommend that different scales are used in future trials. For example a simple sweat scale might enable robust ranking data to be generated".

"It must however be remembered that the subjective scales and the questionnaires used during this trial were not required of the Standard; they were included in this trial in an attempt to make the assessment more rigorous and more informative. Annex E of Standard prEN 469:2002 in its current form does not make enough allowance for the inter-individual differences in sweat rate, core temperature dynamics or heart rate response to exercise. Nor does it take account of the superior wicking properties of modern fire protective fabrics. We would recommend that a different approach is made to assessing fire fighters' clothing".

Design room (computer aided design for fire fighters' clothing)

Picture courtesy of Bristol Uniforms Ltd.

"In general terms the modified test used in the present study was successful for the following reasons. It took into account the fitness profile of each volunteer. The exercise intensity was calculated from oxygen uptake data, a measure that is consistent over time. Each volunteer completed the protocol without risk to his or her health and safety. The exercise intensity was still sufficient to identify differences in fire-kit ensembles".

In summarising the results of the trials, Human Vertex Ltd concluded that "this study showed that there was no significant difference between the fire-kit ensembles in terms of the physiological effects upon volunteers. They were however, significantly different in terms of comfort, fit, and fitness for purpose, i.e. their ergonomic performance differed".

"This report also shows that subject-specific, low intensity exercise performed in fire-kit can elicit sufficient changes in physiological and subjective responses to enable fire-kit ensembles to be assessed safely. It also presents an appraisal methodology that uses fire-specific drills and bias-free questionnaires that are capable of eliciting robust, statistically significant rankings of fire-kit ensembles".

"It is recognised that more work needs to be completed before robust and fair pass/fail criteria can be introduced into a modified version of Standard prEN469:2002. However the protocol described in this report could form the basis for a revised Standard".

In a concluding comment on the value of these extensive trials, Ian Mitchell added, "This research clearly shows the importance of good practical ergonomic design and an understanding of the physical demands placed on fire fighters. PPE needs to work as much as possible in harmony with the fire fighter".

Digital video s
Using CCTV for

By Kenneth L. Gentile, P.E.

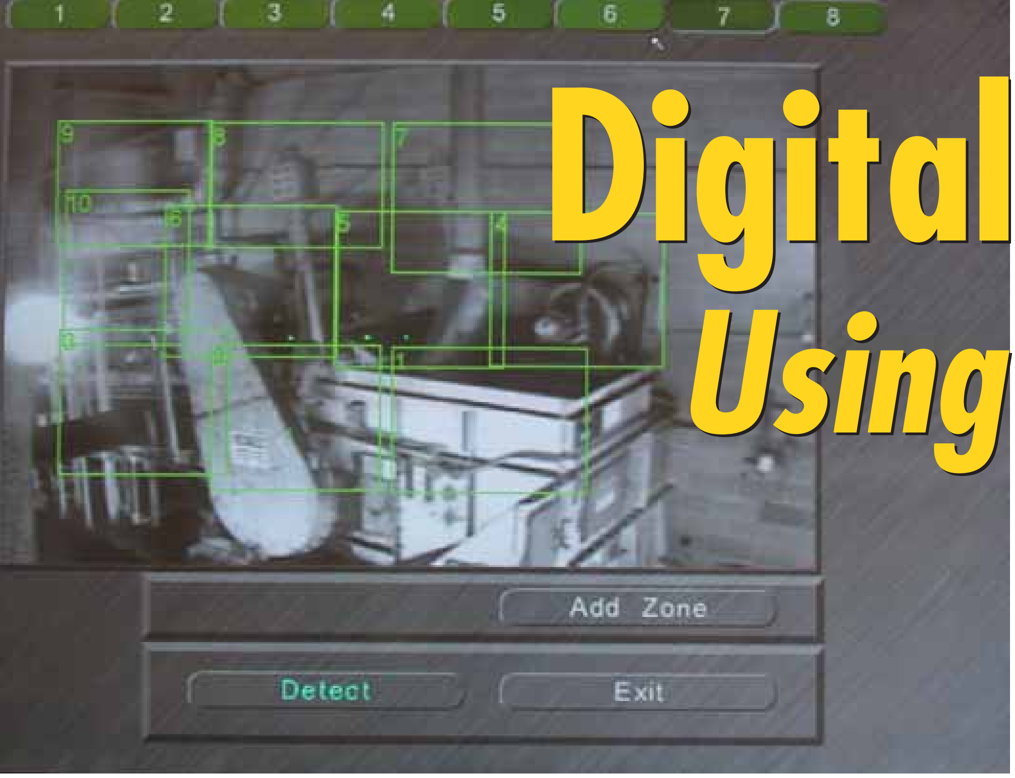


Figure 1 *Photograph courtesy of Midwest Generation-Peoria IL; and Fire Sentry-Brea, Ca*

UNLIKE SOME TECHNOLOGIES that evolve gradually, automatic fire and smoke detection mutates in a series of distinct, innovative steps. These innovations continue to change the methods for sensing the presence of a developing fire; for analyzing data at detectors and for transmitting situation conditions to responding personnel. Examples of conventional detecting methods include, various thermal elements (heat); photoelectric, ionization, and aspiration (smoke); and Ultra-violet/Infra-red (flame). Examples of analytical improvements include the development of analog thermal sensors in lieu of bi-metallic or fused element heat sensors and analog evaluation of smoke levels by the detectors. Transmitting conditions has improved considerably with the specific device locations (addresses) and enhanced LCD (liquid crystal diode) and CRT graphic displays. Each of these innovations has impacted the fire alarm market, installation methods and code requirements to varying degrees. Now another new development, digital video smoke detection, provides a radical, new option in automatic fire detection.

Digital video smoke detection (DVSD) is the coupling of Closed Circuit Video Cameras (commonly known as CCTV) with innovative, motion-sensing software to detect the presence of smoke. The concept is quite simple. You or I visually see smoke and; by mental processes, we recognize it as smoke and act to summon aid. In this same manner, the CCTV camera “sees” the smoke, processes the image motion (in a dedicated computer) to recognize the smoke; and activates an alarm.

The sections that follow provide a basic understanding of the system and its implications for potential end-users of DVSD. A comparison of the conventional detection methods to DVSD operation is followed by a description of the system equipment requirements. The current DVSD status in the code community and with the listing agencies is discussed. And the final two sections explore benefits and applications; and design and installation considerations.

BASIC PRINCIPLES: CURRENT DETECTION METHODS

DVSD is different from other types of automatic fire detection in its method of coverage, analysis of data and the information available to responding personnel. Consider how it differs from the each of the following types of conventional automatic detection:

- **Photo-electric and Beam**
- **Ionization and Cloud Chamber**
- **Heat (Temperature Change)**
- **UV and IR Flame**

Photoelectric, “spot” type, smoke detectors are in common use because of their adjustable sensitivity, economy and have become must less prone to nuisance alarms due to technological improvements of the past decade. Photoelectric Beam detectors have applications in high ceiling and open areas. Both of these detectors rely on the migration of smoke into the path of a laser. In the spot detector, the light

> *Photoelectric, “spot” type, smoke detectors are in common use because of their adjustable sensitivity, economy and have become must less prone to nuisance alarms due to technological improvements of the past decade.*

moke detection:
Smoke Detection

beam is internal to a chamber in the detector head while the beam detector transmits its light beam across the coverage areas. The obstruction of the beam affects the electrical settings in the detector, the extent of the affected settings is then interpreted by firmware in the panel or detector itself.

Similarly, ionization type "spot" type smoke detectors and cloud chamber detectors must rely on the migration or inhalation of smoke. For these detectors the particles of combustion react with ionized particles in an internal chamber to affect the detector's electrical. The resulting change in electrical settings is also interpreted by firmware in the panel or detector itself.

Automatic heat detection can be a simple sprinkler, thermal element device or sophisticated analog temperature sensor. The simpler devices have mechanical elements that change the state of electrical contacts when deformed by heat and the more sophisticated devices use temperature-sensitive electronics to report the temperature at the detector. In order to activate either type of mechanism, heat from a fire must migrate to the detector.

Ultra-violet (UV)/Infrared detectors are electronic sensors that pick up energy with those frequencies of the photo-radio spectrum emitted by a spark or a flame. This results in rapid response as neither heat nor smoke must move to the detector, but the detector must have a direct line-of-sight with the flame, spark or ember. The detector's electronic logic then provides a change of state to electrical contacts that are often connected by addressable monitoring modules to a fire alarm system.

BASIC PRINCIPLES: DVSD

One disadvantage of monitoring heat and smoke by the above methods is that the heat or smoke must migrate or otherwise be drawn to the detector. This results in a delay and often the path of the heat or smoke can be obstructed. The UV/IR does not have the disadvantage waiting on the heat or smoke movement, but is unable to activate if a flame or ember is obstructed from the sensor's view. DVSD is not subject to either of these disadvantages.

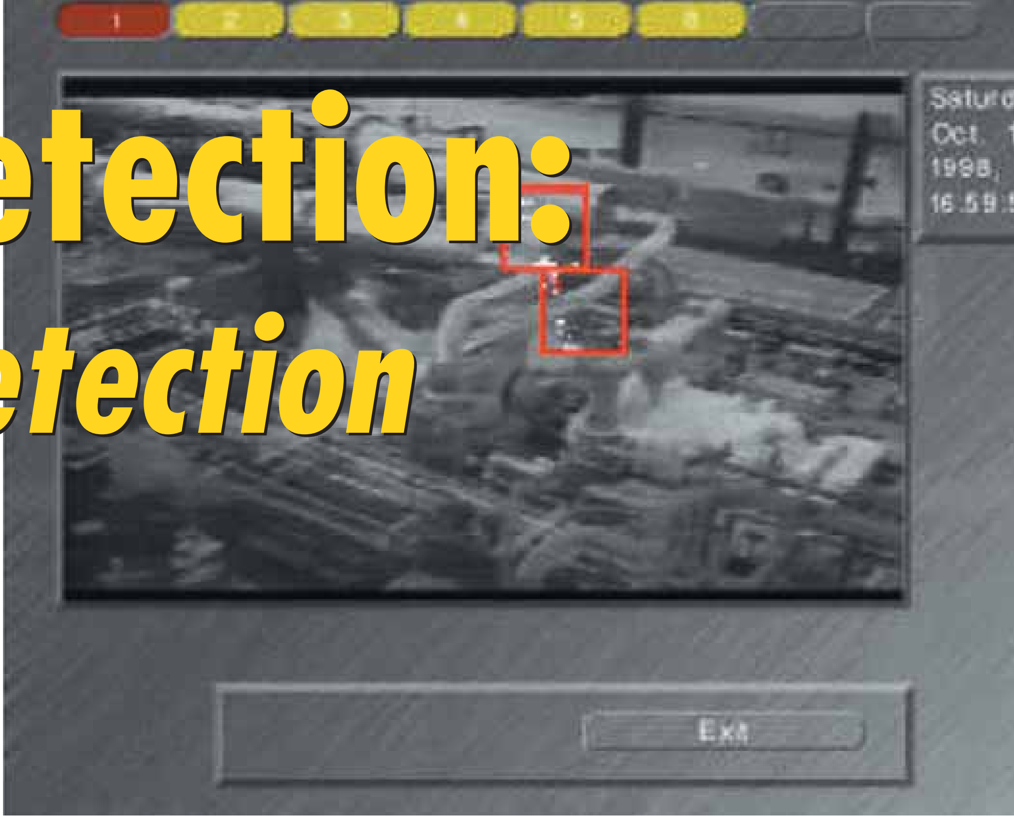


Figure 2 *Photograph courtesy of Fire Sentry-Brea, Ca*

The basic premise of DVSD uses the same method that you or I would use to detect smoke by sight. By "watching" an area and then recognizing smoke by its visual characteristics, a camera generates the electronic signal of the image in covered area. If the camera is digital, the signal is directly sent to the central processing unit (CPU). If the camera is analog, the signal is converted in an A/D converter and then received by the CPU Software in the CPU then looks for a specific electrical signal pattern that is consistent with the motion of "hot" smoke. Upon recognizing this signal, the CPU generates an alarm condition by both electrical contacts that can be monitored by fire alarm or other equipment and indicating the location of the smoke on a visual monitor for authorized personnel (refer to *figures 1 and 2*).

The concept is the same as security motion detection for CCTV, but the software is more specific and sophisticated in what it identifies. Multiple cameras can be monitored by the same system and the areas under surveillance can be quite large. As can be seen in *figure 1,* the DVSD software provides graphic enhancements to indicate multiple zones (numbers shown along the top of the image) in outlined "boxes" in

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Digital video smoke detection

the camera view. Each zone can be reported as a separate alarm initiating point. Upon identifying smoke, the graphics will indicate the location of the smoke (the red "boxes" of *figure 2*). The response is, in fact, so specific that most programs that programs will identify the smoke location before it is visible on the monitor.

As for false alarm, the programs can distinguish between smoke and steam, fog, or other vapors and only alarm on smoke. As a digital video image, the system programming also permits "pre" and "post" event recording of images on the CPU hard drive. The causes and perpetrators of fire events can be more effectively documented.

THE EQUIPMENT

The "hardware" components are straightforward as illustrated in *figure 3*. A camera is required that meets a specified performance. If an analog camera is used, then a signal A/D converter is required. The centerpiece is a processing unit that includes programming keyboards and data ports. Monitors can be provided in almost any desired configuration. And finally interfaces to fire alarm systems or other video or automatic building systems.

The software provider will typically provide the industrial grade CPU and one station for operator interface. Often any A/D conversion is included in this CPU. The cameras can be provided by numerous vendors but must meet the software provider's specifications (these are not usually onerous requirements) and sometimes the existing cameras are adequate. Similarly, the monitors should be sufficient to meet the requirements of the responding personnel and are available from many vendors. Devices that interface the CPU with the fire alarm systems, wans, LANs or building automation systems must communicate in the appropriate protocol. The CPU provides an output digital video signal and "change-of-state" contacts for interfacing.

DVSD AND THE CODES

European electric generating plants were the first to seek a solution to early detection of smoldering fires in the large open structures that housed turbines. This use is supplemental smoke detection and is not considered an issue for the regulatory requirements of the model building codes used in the more conventional occupancies. As such, concern with acceptance in the codes that govern occupancies in the United States and other countries were not a priority of the developers. As interest in using DVSD as a smoke detection method where smoke detection is a regulatory requirement, the code and standards bodies of the western hemisphere are considering listing and installation requirements.

In the United States, only one vendor has obtained FM Global approval. Other agencies, such as Underwriters' laboratories do not, as yet, have listing methods. The National Fire Protection Association, responsible for *The National Fire Alarm Code* (NFPA 72), is presently considering proposals to permit DVSD as an acceptable smoke detection in the 2006 edition. For the present, however, DVSD can only be used as a substitute for recognized automatic and smoke detection methods where specific permission is received from the local authority having jurisdiction. Even with the FM Global listing, pending adoption by NFPA, installation usually requires acceptance of a formal request for a variance or waiver.

BENEFITS AND APPLICATIONS

With an understanding of the basic operation and the equipment requirements, the number of difficult smoke detection problems that can be addressed by DVSD quickly grows. These include detection in specific environments, differing lighting conditions, and occupancy types that aren't easily covered by the conventional detection methods. Additionally the use of cameras that can cover large view areas and have alternate applications in security systems can contribute to the cost effectiveness of the system.

As the smoke need only be in the camera's view, a camera can be installed in a location that is protected from the area of coverage by glass or special enclosures. This permits using cameras protected from the classified, harsh, or exterior environments that require the smoke detection. One installed application is in a coal crushing facility of a power generation plant. The system provides effective automatic fire detection as enclosures protect the cameras; the wide view range permits coverage of the large open areas; and the software is not affected by dust or fooled by the presence of the none smoke particles.

Another critical characteristic is that the software works as well with "low-light" and infrared cameras as with conventional cameras. Because the movement of smoke generates the same

> *With an understanding of the basic operation and the equipment requirements, the number of difficult smoke detection problems that can be addressed by DVSD quickly grows.*

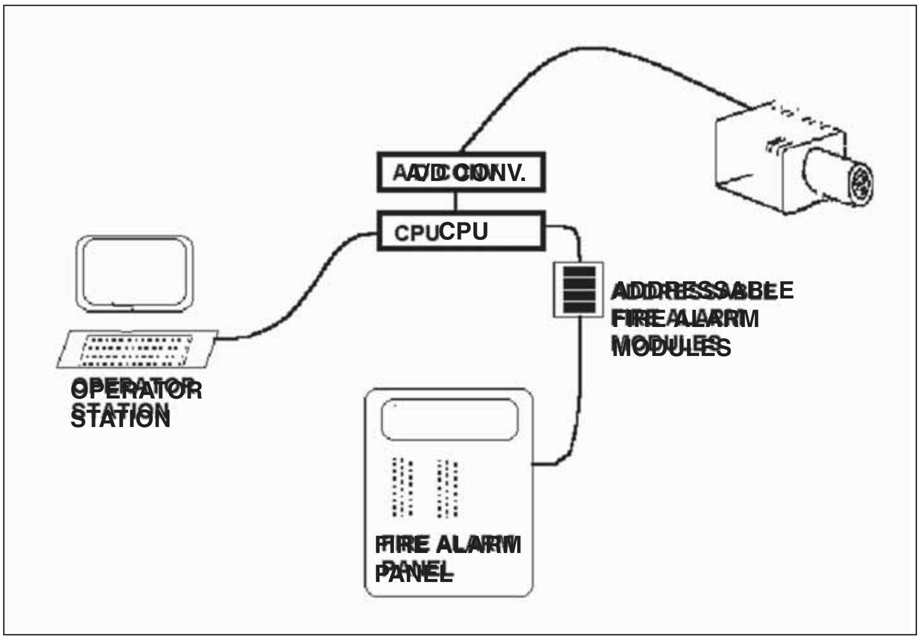

Figure 3

electric signal from a low light or thermal camera image, the software can recognize the presence of smoke in these conditions. This permits use in areas subject to light levels that change as a result tasks, hours of usage, or sunlight. This has resulted in European highway systems using DVSD in tunnels for protection of moving vehicles.

Some occupancy types require smoke detection for which conventional detection is not well suited. Consider a large exhibition hall. As an assembly occupancy, some jurisdictions require smoke management systems to be initiated by automatic smoke or fire detection. The preferred method is to install photoelectric beam detection. Many of the conventions and exhibitions, however, install banners, hanging and floor mounted displays and a variety of floor arrangements that can interfere with both the line of the detector beam and the migration of smoke to the beam. If the hall is large, the large number of spot type smoke detectors required would be expensive and possibly aesthetically displeasing. DVSD cameras can be placed to cover the entire hall and spot the smoke movement no matter what path it takes around obstructions.

In all of the above-described locations, and in most other possible uses for DVSD, the use of cameras for security is increasingly a necessity. Nothing prevents the DVSD camera system from performing double-duty as security cameras. The proposals under consideration by NFPA will, if adopted, will require specific installation methods and monitoring, but the images can still be used for both security and life safety purposes. The digital video output from the CPU (including the camera number, zone, and alarm graphics) can be transmitted just the same as any other digital video signal. The images, while still performing the life safety system functions, can be transmitted to building automation reporting systems, area network infrastructures and by wireless technologies to responding personnel.

DESIGN AND INSTALLATION

Many questions should be answered prior to procuring a DVSD system. These include, but are not limited to:

- Is DVSD the most appropriate technology for my application?
- Is the Facility suitable for DVSD installation?
- How will my staff use and maintain the DVSD system?
- What systems can benefit from interconnection with the DVSD?
- Do I need to address code or listing issues with regulators?

A detailed engineering assessment should be performed to address these and other concerns before any design or purchases. It is during this assessment, that code and standards issues should be broached with the authority having jurisdiction for life safety.

The design of the system requires expertise in fire initiating device coverage and digital video system specification. The camera placement must provide adequate view areas. Placement of the CPU, interfacing system connections, circuits, and other components should comply with standardized supervision and survivability practices. And the specification of equipment must not only be suitable for the software vendor, but must also perform reliable for the duty and environment of the intended application.

As for procurement, selection of the software vendor is presently limited to only a few providers (of which only one is known to the author to have obtained a listing acceptable to most U.S. authorities). The providers of the components and installation, however, should be limited to only qualified digital video contractors and manufacturers. In the wide-open arena of video installation, there are shoddy equipment vendors and trunk-slamming contractors who offer installations "too good to be true". Construction documents should provide enforceable specifications and layouts, as well as qualification requirements for installing contractors.

Finally, as a new technology, designers should work with the installers to provide a detailed and workable preventive maintenance program. If used a part of the life safety building systems, compliant testing and inspection procedures should also be developed.

FUTURE CONSIDERATIONS

DVSD is a technology that offers solutions to a continually growing number of challenges stemming from the need for pervasive digital video in point-of-sale, surveillance, access control, asset protection and other applications. Since digital video often competes for the same resources as do the life safety systems, DVSD is uniquely suited as a multi-task tool. Also, the Twentieth Century analog video systems are rapidly being replaced by digital video. The new systems must be engineered to accommodate enhancements, such as DVSD, to minimize rapid obsolescence and to reduce system life-cycle costs. Finally, the images and information that DVSD can transmit, improves the ability to remotely evaluate an incident and to remotely reconnoiter a facility in crisis. That we must provide detailed information to our responding personnel, before they enter a site, is one of the first, and most painful lessons learned for life safety in the Twenty-first Century.

Kenneth Gentile is a Professional Engineer and Senior Consultant in the Houston Office of Rolf Jensen & Associates. Mr. Gentile can be reached at kgentile@rjagroup.com.

AKRON BRASS ANNOUNCES SALES MANAGER FOR ASIA

Akron Brass Company has recently appointed Anthony H. Chang as Sales Development Manager for Asia.

Anthony holds a Degree in Engineering Electronics from the University of Leicester in the U.K. Anthony most recently worked for Comfort Delgro Engineering in Singapore as Manager, Special Vehicles working with government agencies on special vehicles; fire trucks, ladders, command vehicles and ambulances.

Founded in 1918, Akron Brass is a worldwide marketer and manufacturer of high performance fire fighting and rescue equipment. A Premier Farnell company, Akron Brass is ISO 9001: 2000 registered and has an excellent reputation for the development and manufacture of quality products.

For further information, please contact:
Akron Brass Company
Tel: +65 9686 4489
Email: antchang@singnet.com.sg

THE BILCO COMPANY ANNOUNCES OPENING OF FAR EAST SALES OFFICE

Lawrence Wong Appointed as Regional Sales Manager

The Bilco Company, manufacturer of specialty access products for commercial and residential markets, announces the opening of its newest sales office, Bilco Far East. This new location will serve Bilco's customers in Hong Kong, China, and all other Asian countries.

Bilco has appointed Lawrence Wong regional sales and marketing manager for Bilco Far East. Wong is a resident of Hong Kong and has extensive experience in the industry, including several years with William Jacks & Co., a trading company for architectural products. Wong holds a master of business administration degree from The University of New Castle, Australia.

"Asia is an important and fast-growing market for Bilco," stated International Sales Manager Greg Kennedy. "The opening of Bilco Far East and the addition of Mr. Wong as sales manager will allow us to better serve our customers in Hong Kong, mainland China, and elsewhere in Asia."

For further information, please contact:
Bilco Far East
Email: Lawrence@bilco.com
Website: www.bilco.com

IMPROVED CAFS TECHNOLOGY FROM HALE PRODUCTS EUROPE

The Godiva World Series pump with integrated Compressed Air Foam **(CAFS)** has now been upgraded to incorporate the latest in electronic foam proportioning systems. The CAFS is a compact package mounted on the rear of the pump comprising of a compressor, FoamLogix 2.1 electronic proportioning unit and Hale X-mixer system and full instrument panel.

The FoamLogix 2.1A proportioner provides computer-controlled accuracy of foam injection across a 0.1 to 9.9% range. A Class1 flow sensor constantly monitors water discharge to maintain the required foam injection ratio. The FoamLogix system features a compact control unit mounted in the pump panel with precise push button control and display of water flow rate, foam injection ratio, total water flowed and total foam concentrate used. A bar graph indicates the system capacity when in operation. The system has an operational range of 4 to 10 bar and a relief valve protects the foam pump from over-pressurisation.

The CAFS control now includes an incremental air ratio control with indicator display to provide infinitely variable wet or dry foam consistency and the option to select non-CAFS foam if required.

The comprehensive pump instrument panel now features high visibility Class1 foam and water tank level readouts, joystick type pump speed control with pre-set idle option, engine status warning lights and an emergency stop button. The entire unit is mounted on an integral anti-vibration cradle complete with drain connections for ease of OEM installation.

The benefits of CAFS are increasingly recognised as –

- A more efficient way to fight fires with reduced knock down times
- Reduced water usage and damage
- Reduced environmental impact
- Increased media projection

The Godiva World Series pump with CAFS represents a major step forward in fire fighting technology providing enhanced performance and operator control.

For more information, please contact:
Hale Products Europe
Tel: +44 (0) 1926 623600
Email: admin_haleuk@idexcorp.com

DAT™4070S FOUR LINE MASS CASUALTY DECON SHOWER SYSTEM FROM FSI

FSI proudly offers the DAT™4070S 4 Line Mass Casualty Portable Haz-mat Decon Shower System built to the same demanding specifications as the entire line of FSI Shelters/Showers recognized by heir EMS Blue Colour, in multiple sizes, with an integral ground floor that will hold up to 350 gallons of water before requiring pump out, 4 roll up windows, 2 skylights, full closure slip in and out dirty entry/clean exit doors, 4–14′ dia. HVAC/Clothes ducts, air inflation valve and hose, pressure relief valve, Pegs/Rods/Bag/Tie Downs, Repair kit, manual, carry bag, and 2 upper air vents.

The unit can handle 4 or even up to 8 non-ambulatory stretcher borne personnel, or 8 or even up to 12 ambulatory victims at one time, or any combination of the above in the middle 13′ W X 13′ L shower area.

The DAT™4070S offers private dry undress and redress areas in all 4 lines in a 13′ W X 23′ L X 9′ H 300 sq. ft. unit.

For further information, please contact:
FSI North America
Tel: +1 440 891 1523
Website: www.fsinorth.com

GB SOLO ANNOUNCE W. H. BRENNAN AS THEIR FIRST ASIA PACIFIC DISTRIBUTOR

In the two years since **GB Solo** established its Asia/Pacific Rim base in Kuala Lumpur the company has seen steady growth in revenues and market share.

James Brooks, Sales Director, says "The export potential of the Asia/Pacific Region has always been of interest to GB Solo, but we felt that we could not service the region professionally without an established presence. We committed to that in late 2001 and by end of the first quarter of 2002 we had our operation up and running."

GB Solo's traditional competitors, namely the hand-held thermal camera suppliers, were already well established in the region and the company knew that it would not be easy to win business.

Two years on, the business model seems to be working. Says James Moloney, Sales Manager Asia/Pacific, for GB Solo, based in Kuala Lumpur "Introducing the concept of hands-free thermal imaging to a new market where previous exposure was non-existent was always going to be a challenge. Our strategy of focusing on the regional Armed Forces has paid dividends, with contracts signed in the past twelve months with Naval, Air Force and Civil Defence Forces for supply of SOLOtic and Unifit integrated helmets as well as the SOLOvision camera range."

GB Solo is also reporting significant sales of SOLOvision cameras in China. "This market will be very important for us in years to come and, although very competitive, our products, especially SOLOvision, have earned the respect of the end-users who have had the opportunity to evaluate them", said James Moloney.

GB Solo operates its regional sales activities via a network of exclusive distributors. With distributors already established in Malaysia, Singapore, China, Australia – and others coming on-stream on a regular basis, the potential for growth is now well established.

W. H. Brennan & Co. Pte Ltd in Singapore was one of the first to sign as a distributor in the region. Part of the Survitec Group of companies, W.H. Brennan has used its excellent track record with the Singapore Armed Forces and Police to win competitive "knock outs" against incumbent suppliers – and to quickly establish GB Solo as a leading edge solution to the use of Thermal Imaging Cameras as a "tactical" fire-fighting tool, rather than just a tool to be used by a "cameraman".

W.H. Brennan's record with the Singapore Armed Forces and Police also creates a ready-made opportunity for GB Solo's latest thermal camera – SOLOvision Stealth.

A variant of the fire-fighting camera, the Stealth is aimed at security applications and has been customised for that market following recommendations from British Special Forces. Stealth cameras are currently being evaluated by Special Forces and Security Services across Asia, Europe and the Middle East. The company is confident of the potential for a low-cost, ruggedised TIC that can be worn on a face-mask, or helmet visor, thus allowing the user to operate a weapon with two hands while providing an excellent thermal view of the scene.

For more information, please contact:
GB Solo Ltd.
Email: sales@gbsolo.co.uk
Website: www.gbsolo.com

CO$_2$ CONTINUES TO PROVIDE STATE-OF-THE-ART SOLUTIONS

Australian developed Pyrozone Low-pressure CO$_2$ Gaseous Systems have at their heart an innovative modular storage programme with liquid CO$_2$ capacities of 555kg, 355kg, and 155kg.

Each storage unit features an electronic self-diagnostic capability that continuously monitors CO$_2$ contents, gas pressure and power supply.

This information can be reported to a central control station reducing the need for on-site surveillance whilst promoting action prior to losing protection, a feature appreciated by end-users and underwriters alike.

Pyrozone LP-CO$_2$ Systems are supported by SSL [Aust'], FM [USA] and other National Accreditations along with a substantial installed-base in most Asian markets.

Pyrozone Systems have one of the lowest 'cost of ownership' profiles of any gaseous system technology on today's market.

For further information, please contact:
Pyrozone Manufacturing Pty Ltd
Email: info@pyrozone.com.au
Website: www.pyrozone.com.au

HOLMATRO'S NEW AND EXTENDED VEHICLE EXTRICATION TECHNIQUES PROGRAMME

Now also available as poster series and animated CD-ROM!

Constant developments in the field of vehicle extrication require ongoing training and education. When it comes to live-saving operations, the right knowledge and skills are just as important to rescuers as working with the best tools. That is why leading manufacturer of hydraulic rescue equipment **Holmatro** recently introduced Vehicle Extrication Techniques: a compact, yet comprehensive 100-page guide on rescue tool handling and vehicle extrication which discusses various basic techniques with the help of many full-colour illustrations. This programme in book form has now been extended with a series of 8 posters and an animated CD-ROM.

Like the book, both poster series and CD-ROM avoid long texts and provide step-by-step explanations of basic extrication techniques by means of many clarifying illustrations (posters), animations and videos (CD). This makes Vehicle Extrication Techniques highly suitable for (classroom) training, reference or to brush up your personal skills. Apart from a main focus on various extrication techniques the programme also deals with related topics, such as safety, equipment handling, new vehicle design and construction, and vehicle stabilization.

A preview of the CD-ROM can be found in the download section on our website www.holmatro.com.

For further information, please contact:
Holmatro Rescue Equipment B.V.
Email: info@holmatro.com
Website: www.holmatro.com

MIDDLE EAST SALES LEAD TO HUGHES EXPORT DRIVE

Hughes Safety Showers has reported a 500% increase in the value of exports to the Middle East during the first six-months of 2004 compared with the same period last year. The latest order for 20 chilled tank showers with integral eye/face wash fountains, for Saudi Arabia, was won by Hughes Notduschen, the Group's German subsidiary,

"It underlines the importance of being able to meet customers' precise requirements and the contribution this has made to the growth in business," says Managing Director Tony Hughes.

"We offer the reassurance of well proven emergency safety showers with the ability to modify designs to cope more effectively with local ambient conditions. In the Middle East for example, high temperatures can all too often be a serious problem."

Additional insulation and the use of reflective sunshades on the 1200 litre storage tank help to reduce the increase in water temperature during the day. A cooling coil in the tank, supplied by an air-cooled condensing unit, provides further temperature control to keep the shower water within safe limits. The inclusion of a submersible pump in the tank to mix the water has also proved to be a more reliable solution than an externally mounted mixing unit normally fitted in a less hostile environment.

Alarms provide immediate warning of an excessive temperature rise or other conditions that would affect safe operation.

For further information, please contact:
Hughes Safety Showers
Tel: +44 161 430 6618
Website: www.hughes-safety-showers.co.uk

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